
THE GRASSES OF CHIQUITANIA, SANTA CRUZ, BOLIVIA¹

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ABSTRACT

A checklist is provided for the Gramineae of the Brazilian Shield region in eastern Santa Cruz, Bolivia. Annotations include keys to genera and species, a regional synonymy, notes on habitat preference, geographic distribution, cytology, phenology, and palatability for 275 species of tropical grasses; six new taxa are described: *Andropogon sanlorenzanus*, *Eragrostis chiquitaniensis*, *Eriochrysis* × *concepcionensis*, *Paspalum kempffii*, *Schizachyrium beckii*, and *Thrasya crucensis*.

Chiquitania is a region in eastern lowland Bolivia which includes the Provinces of Ñuflo de Chávez, Velasco, and Chiquitos in the Department of Santa Cruz. Recognized as a distinct cultural and geographic region, it has a unique natural history when compared with other parts of eastern Bolivia. Situated on the extreme western edge of the Brazilian (Precambrian) Shield, it is characterized by a variable topography (altitude 300–1,240 m) that supports a high diversity of forest, savanna, and savanna wetland communities. Encompassing approximately 170,000 km², Chiquitania is bordered on the south by the Serranías Chiquitanas, to the west by the alluvial plains of central Santa Cruz, to the east by the Gran Pantanal of Brazil, and to the north by the Department of the Beni (Fig. 1). Although it was colonized over 250 years ago by Jesuit missionaries, the vegetation of the region remains largely unaltered as the local inhabitants have utilized the native savanna for cattle production while exploiting the forest for timber, rubber, or wildlife. Shifting agriculture, while common, does not currently pose a threat to the existing forest vegetation. However, the recent introduction of exotic forage grasses adapted to forest soils threatens to disrupt traditional patterns of agriculture. Due to increased productivity and better nutritional quality, these grasses allow for higher stocking rates and the easier management of cattle. Consequently, forest destruction for pasture estab-

lishment is occurring at accelerated levels. It is hoped that a better understanding of the native grasses will promote range management techniques which improve the productivity of savanna vegetation, while at the same time helping to preserve some natural communities. This checklist is the partial result of three years of work in the region studying the autecology of the native grasses. Analytic results of the autecological investigations, as well as general descriptions of the vegetation, will be reported in future publications.

CLIMATE

The region has a typical savanna climate or "Aw" in the Koppen classification. The regional airport at Concepción (16°03'S, 62°10'W; altitude 500 m), has meteorological data spanning 35 years (Guamán & Valverde, 1982). Mean annual precipitation is about 1,200 mm with a marked dry season of five months during the austral winter. Annual fluctuations vary greatly, ranging from 700 mm to 1,500 mm. Mean daily temperature varies only slightly throughout the year, reaching a maximum in November (26°C) and a minimum in June (21°C). Strong cold fronts sweep through the region during the dry season, causing the temperature to drop to 10°C for short periods. Maximum temperatures of about 33°C are common in November at the beginning of the rainy season.

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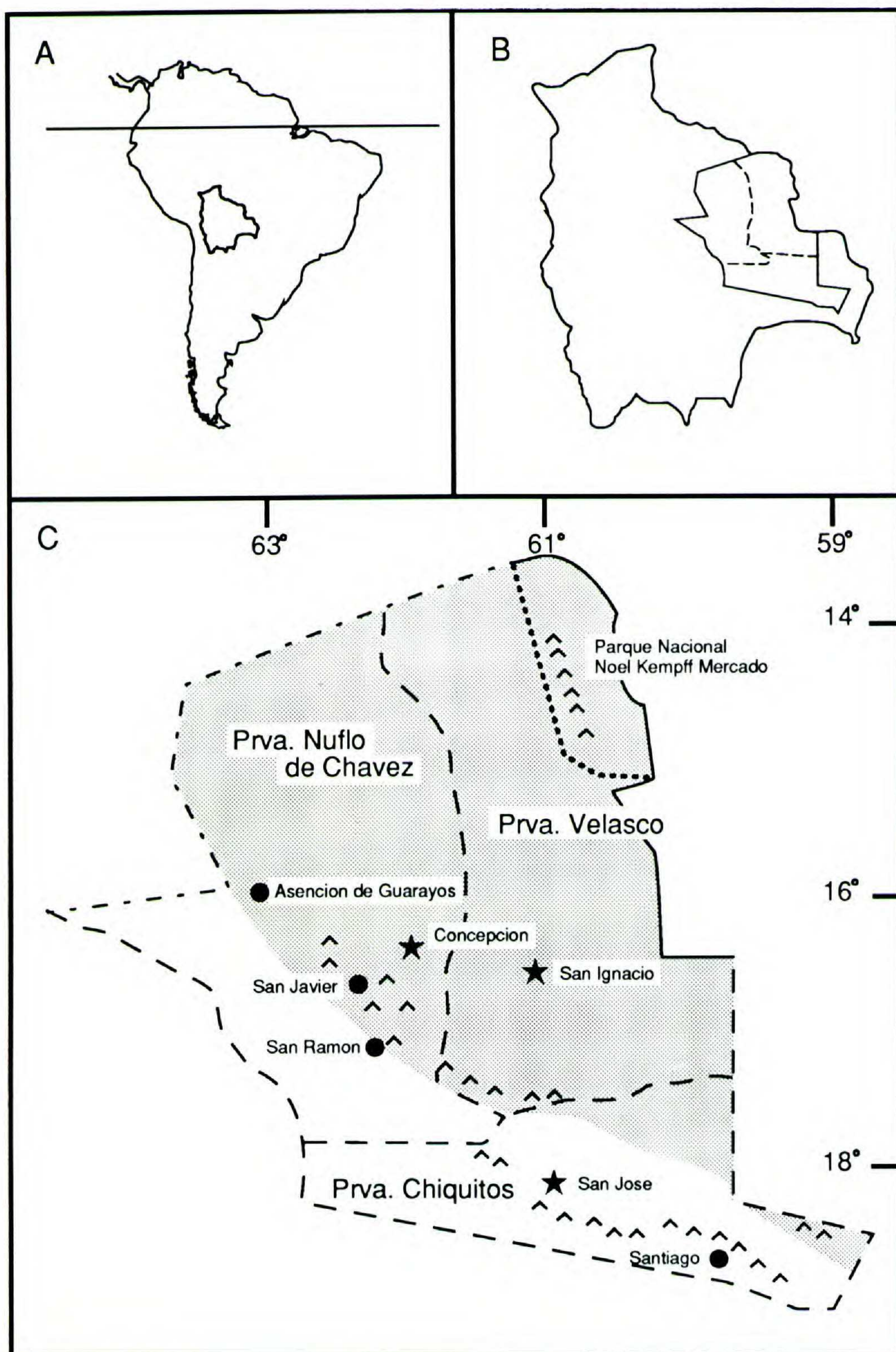


FIGURE 1.—A. Map of South America showing Bolivia.—B. Geographic position of Chiquitania within Bolivia.—C. Chiquitania in detail: stippled area corresponds to the Brazilian (Precambrian) Shield; stars represent provincial capitals; dots are other large villages; and carats mark serranias or hill country. A solid line marks the international border with Brazil, a dash/dot line demarcates the Department of Santa Cruz from the Beni, dashed lines mark provincial boundaries, and a dotted line delimits the boundary of Parque Nacional “Noel Kempff Mercado.”

VEGETATION

The vegetation in Chiquitania is similar to that described for the adjacent regions of central Brazil and, although Bolivians have developed their own vernacular terms for describing the vegetation in Chiquitania, I use the standard terminology developed by Brazilian ecologists (Eiten, 1972, 1978; Ratter et al., 1988). *Cerrado* refers to a complex of intergrading communities that range from low

forest to open grassland and that are characterized by the presence of tortuous, woody species with thick stems and coriaceous leaves. *Cerrado* is the most common savanna vegetation in Chiquitania and is usually restricted to eroded Tertiary planation surfaces or the upper slopes of low hills (500–700 m). Easily recognized due to its distinctive physiognomy, these well-drained savanna communities are western disjuncts separated from the *cerrado* province of central Brazil by the more

TABLE 1. A comparison of the floristic similarity of the grasses of Chiquitania with other neotropical floras.

Geographic region	Source	Total species ¹	Species in common	Index of similarity ²
Chiquitania	This study	250	—	—
Andean Piedmont of Santa Cruz, Bolivia	Foster (1966) and others ³	120	100	53
Llanos de Mojos, Beni and northeastern La Paz, Bolivia	Beck (1984) Haase & Beck (1989)	112	78	43
Paraná, Brazil	Renvoize (1988)	329	120	40
Bahia, Brazil	Renvoize (1984)	331	114	39
Santa Catarina, Brazil	Smith et al. (1982)	343	108	36
Costa Rica	Pohl (1980)	392	108	33
Entre Ríos, Argentina	Burkhart (1969)	319	79	28
Central Andes	Hitchcock (1927) ⁴	642	123	27
Tucumán, Argentina	Türpe (1975)	298	57	21

¹ Excludes cultivated grasses and those species included by the authors that occur only in adjacent regions.

² Sørensen (1948):

$$\text{index} = \frac{\# \text{ of species in common to A \& B}}{(\# \text{ of species in A} + \# \text{ of species in B})(0.5)} \times 100.$$

³ Consisting mainly of the collections of José Steinbach as cited by Foster (1966) and additional collections known to the author, particularly those of Michael Nee (NY).

⁴ Excludes species recorded only from the Andean Piedmont of Santa Cruz (i.e., the collections of José Steinbach).

abundant, seasonal forest vegetation. The Bolivians refer to this vegetation as *pampa arbolada* or *arbolada*. Floristically and structurally distinct from *cerrado* is a xerophytic savanna complex known as *campo rupestre* (Eiten, 1978). This treeless savanna occurs as islands restricted to ridge tops 800–1,200 m above sea level. There are a number of *campo rupestre* localities in eastern Santa Cruz, of which the western escarpment of the Serranía de Caparuch (i.e., Parque Nacional “Noel Kempff Mercado”) is probably the most extensive. The Serranía de San Lorenzo, situated near the town of San Javier, is only 40 km from the western edge of the Brazilian Shield (16°15'S, 62°40'W; altitude 900 m) and is one of the most western *campo rupestre* localities in South America. This site has yielded two new grass species and several unique intraspecific variants; undoubtedly, more taxa will be described as the flora of this serranía is documented. The locals refer to this vegetation type as *campo* or *pampa*, distinguishing it from *cerrado* (*pampa arbolada*) by the lack of woody vegetation.

Similarly, the wetland communities common to central Brazil occur throughout Chiquitania. *Valley-side campos* are treeless savannas that occur along erosional surfaces, wherever there is a fluctuating, perched, water table that seeps out on gently sloping valley sides (Eiten, 1978; Goldsmith, 1974). The overflow of rivers on alluvial plains leads to the formation of a *pantanal* complex of *seasonally humid* or *seasonally inundated savannas* (Cole, 1986; Eiten, 1978). Scattered across these open grasslands are raised earth platforms built up by termites; these support *cerrado* species or low forest. At the base of valley-side *campos* and scattered across the *pantanal* complexes one finds *savanna marsh*, a savanna wetland community with saturated soils throughout the year. Beck (1984) and Haase & Beck (1989) reported on similar extensive savanna wetlands in the Department of Beni. The residents of Chiquitania generally refer to all savanna wetlands as *curiches*.

Ruiz (1982) conducted a preliminary inventory of the *seasonal forest* communities near Concepción in the Province of Ñuflo de Chávez. The forest

TABLE 2. The geographic distribution of the grasses recorded to occur in Chiquitania, Santa Cruz, Bolivia.

Pantropical	Neotropical	South American	Southern Cone ¹	Central Brazil ²	Central Andes	Bolivian endemics	Other ³
33	103	38	27	38	2	7	25

¹ Includes central and southern (extra-amazonian) Brazil, Bolivia, Paraguay, Uruguay, and subtropical regions of Argentina.

² Includes central Brazil and adjacent *cerrado* regions in Bolivia and Paraguay.

³ Cultivated grasses and species only collected in adjacent regions of Bolivia.

TABLE 3. Synopsis of the tribes and genera (number of species occurring in Chiquitania).

Bambuseae (8)	<i>Actinocladum</i> , <i>Bambusa</i> , <i>Chusquea</i> , <i>Guadua</i> , <i>Rhipidocladum</i>
Olyreae (4)	<i>Olyra</i>
Streptochaeteae (1)	<i>Streptochaeta</i>
Phareae (1)	<i>Pharus</i>
Oryzeae (7)	<i>Leersia</i> , <i>Luziola</i> , <i>Oryza</i>
Centothecae (1)	<i>Orthoclada</i>
Arundineae (2)	<i>Arundo</i> , <i>Gynerium</i>
Aristideae (13)	<i>Aristida</i>
Pappophoreae (2)	<i>Pappophorum</i>
Eragrostideae (24)	<i>Dactyloctenium</i> , <i>Eleusine</i> , <i>Eragrostis</i> , <i>Gouinia</i> , <i>Leptochloa</i> , <i>Tripogon</i>
Cynodonteae (9)	<i>Chloris</i> , <i>Cynodon</i> , <i>Eustachys</i> , <i>Gymnopogon</i> , <i>Microchloa</i>
Sporoboleae (6)	<i>Sporobolus</i>
Paniceae (144)	<i>Acroceras</i> , <i>Anthaenantiopsis</i> , <i>Arthropogon</i> , <i>Axonopus</i> , <i>Brachiaria</i> , <i>Cenchrus</i> , <i>Digitaria</i> , <i>Echino-laena</i> , <i>Echinochloa</i> , <i>Eriochloa</i> , <i>Homolepis</i> , <i>Hymenachne</i> , <i>Ichnanthus</i> , <i>Lasiacis</i> , <i>Leptocorypheum</i> , <i>Melinis</i> , <i>Mesosetum</i> , <i>Oplismenus</i> , <i>Otachyrium</i> , <i>Panicum</i> , <i>Paspalum</i> , <i>Pennisetum</i> , <i>Rhynchelytrum</i> , <i>Sacciolepis</i> , <i>Setaria</i> , <i>Thrasya</i>
Arundinelleae (3)	<i>Arundinella</i> , <i>Loudetia</i> , <i>Loudetiopsis</i>
Andropogoneae (51)	<i>Agenium</i> , <i>Andropogon</i> , <i>Bothriochloa</i> , <i>Coelorhachis</i> , <i>Elionurus</i> , <i>Eriochrysis</i> , <i>Hackelochloa</i> , <i>Hemarthria</i> , <i>Hyparrhenia</i> , <i>Imperata</i> , <i>Rhytachne</i> , <i>Saccharum</i> , <i>Schizachyrium</i> , <i>Sorghastrum</i> , <i>Sorghum</i> , <i>Trachypogon</i> , <i>Tripsacum</i> , <i>Zea</i>

types described in his study are semideciduous, and the density of the understory is inversely correlated with the development of the canopy. High forest was described as having canopy trees 20–25 m tall and formed one end of a continuum of forest or forest scrub communities that eventually intergrade with *cerrado*. In contrast, *gallery forest*,

which occurs as a narrow strip 50 to 100 m wide on valley floors, is an evergreen community with trees 15–30 m tall. Locally, the various gradations of forest are recognized and referred to as *monte alto*, *monte bajo*, and *monte humedo*. In addition, *granitic outcrops*, locally known as *lajas*, exist as islands within *cerrado*, *campo rupestre*, savanna wetlands, and seasonal forest. These range in size from small outcrops scattered across the landscape to large domes (inselbergs) that can attain a height of 200 m and diameter of 400 m or more.

FLORISTIC RELATIONSHIPS OF THE GRASSES OF CHIQUITANIA

This is the first relatively complete inventory of native grasses from a region in central South America. Table 1 compares the number of species shared with grass floras of Costa Rica, Brazil, Argentina, the Central Andes, and two adjacent regions in eastern Bolivia. The greatest similarity is with the grass flora of the Bolivian savanna regions, followed by the floras of the coastal states of Brazil. Chiquitania shows little floristic affinity with the high altitude grasslands of the Andes or with the subtropical grasslands of Argentina. The similarity to the Brazilian floras is even more apparent when the species are classified according to their geographic distributions (Table 2).

The Bolivian plant collector José Steinbach made extensive collections of grasses near the town of Buenavista on the Andean Piedmont in western Santa Cruz (Foster, 1966). If one assumes that his collections are an essentially complete inventory of the grasses for that region, then the richness of the grass flora of the Brazilian Shield becomes apparent. One hundred thirty more species have been recorded for Chiquitania than for the Andean Piedmont even though the two areas have a high index of similarity. Only 20 species collected on the Andean Piedmont have not also been recorded for Chiquitania. The greater species richness of Chiquitania is most easily explained by the greater diversity of savanna communities in the region, and in part possibly by richness within the savannas. A similar argument can be made to explain the greater number of species reported for the extensive savanna wetlands of the Beni; however, this remote part of Bolivia has yet to be inventoried adequately. This study documents 80 new records for Bolivia, including two genera *Actinocladum* and *Streptochaeta*, and 112 new records for the Department of Santa Cruz. A total of 75 genera and 276 species are reported here (Table 3).

In addition to the key, annotations for each

taxon include citations of recent monographic treatments, regional synonymies (Brazil, Argentina, Uruguay, Paraguay, and the Central Andes), discussion of selected taxonomic problems, notes on habitat preferences, geographic distributions (information collated from existing floras and monographs), palatability, local flowering behavior (peak months italicized), and cytology. Fire is crucial in initiating flowering for many species and these can be found in bloom between July and November at the end of the dry season when ranchers systematically burn native savannas to provide forage for cattle. Palatability estimates (0–4) are based on paired comparisons along fences dissecting overgrazed and lightly grazed savanna (unpublished data), as well as observations made of selective grazing by cattle. Species ranked as (0) either increased in relative abundance or showed no effect in response to overgrazing; a ranking of (1) is given to species that showed no evidence of grazing but were found to be less abundant in overgrazed sa-

vannas; rankings of (2–4) are for species that decrease in relative abundance in overgrazed savannas and/or were observed to be grazed selectively by cattle. Chromosome counts are based on meiotic squashes made in the field and are being independently verified via mitotic preparations (Norman, Quarin & Killeen, in prep.). Specimens cited are those of the author unless otherwise indicated; bold-face numbers are voucher specimens for cytological preparations and usually have a matched set of seeds, which has been sent to the Instituto de Botánica del Nordeste in Corrientes, Argentina (CTES). The distribution of replicate sets of specimens are as follows: Iowa State University (ISC), Herbario Nacional de Bolivia (LPB), Field Museum of Natural History (F), Missouri Botanical Garden (MO), United States National Herbarium (US), New York Botanical Garden (NY), Instituto de Botanica Darwinión, San Isidro, Argentina (SI), and Instituto de Botanica del Noreste, Corrientes, Argentina (CTES).

KEY TO GENERA

KEY TO GROUPS

- 1a. Giant grasses; woody or semiwoody; culms 2–30 m tall Key I
- 1b. Not giant grasses; culms herbaceous or rarely semiwoody; plants prostrate or up to 2 m tall.
 - 2a. Leaf blades constricted at the base into pseudopetiole, the blades lanceolate or ovate; forest grasses ... Key II
 - 2b. Leaf blades lacking pseudopetiole, the blades linear, lanceolate, or ovate; plants of various habitats.
 - 3a. At least some spikelets disarticulating with attached bristles, involucre, rachis internodes, and pedicels, or (rarely) spikelets persistent on the inflorescence and not disarticulating Key III
 - 3b. Spikelets disarticulating without any attached bristles, rachis internodes, or pedicels.
 - 4a. Spikelets disarticulating above the persistent glumes (glumes and lemmas falling in some species of *Eragrostis* but then the palea and rachilla persistent); spikelets 1–many-flowered Key IV
 - 4b. Spikelets disarticulating below the glumes (glumes vestigial in some genera); spikelets 1–2-flowered Key V

KEY I

Giant grasses; woody or semiwoody; culms 2–30 m tall.

- 1a. Foliage usually dimorphic: culms producing leaves with reduced, often deciduous blades, the branches with numerous overlapping leaves with well-developed, pseudopetiolate blades; plants blooming infrequently.
 - 2a. Nodes of culm with a dominant bud (or branch) and 1–many smaller branches, or with a single large branch having numerous secondary branches inserted at its basal nodes; branches thorny or not thorny.
 - 3a. Primary buds (or branches) at each midculm node solitary; secondary branches (if present) inserted at the basal nodes of the primary branch; plants arboreal; culms erect, stout, hollow, or solid at base and hollow towards apex; branches usually thorny, at least at the base of the plant *Guadua*
 - 3b. Primary buds (or branches) at each midculm node numerous, with one large bud and numerous smaller buds (or branches), frequently the major bud remaining dormant and obscured by branches developed from the numerous minor buds; plants vining or scandent; culms solid; branches lacking thorns *Chusquea ramosissima*
 - 2b. Nodes of culm producing several to numerous branches of equal size; branches not thorny.
 - 4a. Branches originating from a triangular shield above the node; forest liana *Rhipidocladum racemiflorum*
 - 4b. Branches originating in a straight line; growing in open savanna or rarely in dense scrub *Actinocladum verticillatum*
- 1b. Foliage not dimorphic, the leaves of culm and branches similar, lacking a pseudopetiole; plants blooming every year.
 - 5a. Spikelets bisexual.

- 6a. Inflorescence a spicate panicle; spikelets glabrous or pubescent but not villous, subtended by an involucre of bristles *Pennisetum*
- 6b. Inflorescence a panicle or panicle of racemes; spikelets villous, not subtended by an involucre of bristles.
- 7a. Spikelets with 3–6 bisexual florets, the callus of the spikelet and glumes glabrous, the lemmas villous *Arundo donax*
- 7b. Spikelets with 2 florets, the lower reduced to a single hyaline lemma, the callus villous, the glumes glabrous or pubescent, the lemmas glabrous to sparsely ciliate *Saccharum*
- 5b. Spikelets unisexual.
- 8a. Plants dioecious; spikelets villous; inflorescence paniculate *Gynerium sagittatum*
- 8b. Plants monoecious; spikelets not villous; inflorescence racemose or highly modified.
- 9a. Foliage basal and caulescent; staminate spikelets apical and pistillate spikelets basal on the same inflorescence; cultivated and wild plants *Tripsacum*
- 9b. Foliage caulescent; staminate spikelets in terminal racemes and pistillate spikelets on axillary cobs; cultivated plants *Zea mays*

KEY II

Grasses rarely approaching 2 m in height; culms herbaceous; leaf blades constricted at the base, forming a pseudopetiole, the blades lanceolate to ovate; forest grasses.

- 1a. Spikelets unisexual; plants monoecious.
- 2a. Pseudopetiole twisted, the abaxial side of the blade facing upward; staminate and pistillate spikelets paired with each other; lemma of pistillate spikelet coriaceous, with uncinata (hooked) hairs *Pharus lappulaceus*
- 2b. Pseudopetiole not twisted, the adaxial surface of the blade facing upward; pistillate spikelets generally terminal on branches with staminate spikelets below; lemma of pistillate spikelet cartilaginous, glabrous or pubescent but lacking uncinata hairs *Olyra*
- 1b. Spikelets bisexual.
- 3a. Pseudopetiole 3–40 mm long; blades with cross veins between the longitudinal veins clearly visible; spikelets terete or laterally compressed.
- 4a. Inflorescence a spike; spikelets terete, aristate, the awns becoming entwined when mature and causing the spikelets to fall as a group *Streptochaeta spicata*
- 4b. Inflorescence a diffuse open panicle; spikelets laterally compressed, awnless *Orthoclada laxa*
- 3b. Pseudopetiole shorter than 3 mm; blades lacking evident cross veins; spikelets dorsally compressed (glumes keeled in *Ichnanthus*).
- 5a. Spikelets subtended by sterile panicle branches; inflorescence a spicate panicle *Setaria*
- 5b. Spikelets not subtended by sterile panicle branches; inflorescence not a spicate panicle.
- 6a. Both glumes equal *Homolepis aturensis*
- 6b. Lower glume $\frac{1}{2}$ – $\frac{2}{3}$ the length of upper glume.
- 7a. Lemma of upper floret with a pair of winged appendages or scars at base *Ichnanthus*
- 7b. Lemma of upper floret lacking winged appendages or scars at base.
- 8a. Spikelets subglobose, black at maturity, obliquely placed on pedicels; glumes and lower lemma with apical tufts of hairs *Lasiacis*
- 8b. Spikelets elliptic or ovate, variously green or purple at maturity, not obliquely placed on pedicels; glumes and lower lemma variously glabrous to pubescent but apices lacking tufts of hairs *Panicum*

KEY III

Spikelets disarticulating with attached bristles, involucre, rachis internodes, and pedicels, or rarely not disarticulating from the inflorescence.

- 1a. Spikelets in fascicles of 1–4, subtended by numerous bristles or enclosed by a spiny bur; inflorescence a spicate panicle.
- 2a. Bristles united in at least the basal $\frac{1}{3}$, forming an indurate spiny bur *Cenchrus*
- 2b. Bristles separated to the base, forming an involucre *Pennisetum*
- 1b. Spikelets usually paired, not subtended by bristles nor enclosed by a spiny bur; inflorescence a raceme, panicle, or panicle of racemes.
- 3a. Spikelets all sessile, or rachis internodes and pedicels connate.
- 4a. All spikelets unisexual; staminate spikelets terminal on racemes, subsessile, chartaceous, paired; pistillate spikelets basal on racemes, solitary at each node, sunken in a hollow, cartilaginous, rachis internode *Tripsacum*
- 4b. Spikelets either bisexual or staminate, never pistillate; staminate and pistillate spikelets paired with each other, rachis internode and pedicel united, indurate but not cartilaginous; spikelets not sunken into hollow rachis internodes.
- 5a. Sessile spikelet globose, the lower glume cartilaginous, strongly pitted; pedicellate spikelet chartaceous, lanceolate *Hackelochloa granularis*

- 5b. Sessile spikelet lanceolate, the lower glume leathery or chartaceous, not pitted; pedicellate spikelet similar to sessile spikelet *Hemarthria altissima*
- 3b. Spikelets sessile and pedicellate (pedicellate spikelet vestigial in some species but pedicel always present); rachis internodes and pedicels not connate.
- 6a. Inflorescence an open or contracted panicle.
- 7a. Pedicellate spikelets nearly identical to the sessile spikelet in form, either bisexual or pistillate.
- 8a. Glumes ciliate along the margins; callus hairs stiffly spreading, $\frac{1}{4}$ – $\frac{3}{4}$ times the length of the spikelet, brown or golden (rarely tan); panicle contracted *Eriochrysis*
- 8b. Glumes glabrous or pubescent but not ciliate along the margins; callus hairs filiform, $\frac{3}{4}$ –2 times the length of the spikelet, white; panicle open *Saccharum*
- 7b. Pedicellate spikelets unlike the sessile spikelet in form, either staminate, vestigial, or lacking.
- 9a. Rachis internode and pedicel with a thin translucent line running lengthwise between 2 strong nerves; inflorescence more or less villous *Bothriochloa*
- 9b. Rachis internode and pedicel terete or flattened but lacking a thin translucent line running lengthwise between two strong nerves; inflorescence glabrous to pubescent.
- 10a. Pedicellate spikelets present, staminate, equal to the sessile spikelet in length *Sorghum*
- 10b. Pedicellate spikelets lacking although pedicel present *Sorghastrum*
- 6b. Inflorescence of 1–several racemes (sometimes the culm freely branched at upper nodes and forming a compound panicle, but then each raceme or group of several digitate racemes subtended by a spatheate sheath).
- 11a. Raceme 1 per peduncle or spatheate sheath.
- 12a. Lower glume of sessile spikelet rugose.
- 13a. Pedicels and rachis internodes auriculate; margins of the lower glume of the sessile spikelet winged *Coelorhachis*
- 13b. Pedicels and rachis internodes not auriculate; margins of the lower glume of the sessile spikelet not winged *Rhytachne*
- 12b. Lower glume of sessile spikelet not rugose.
- 14a. Lower glume of the sessile spikelet sulcate between two lateral keels .. *Andropogon*
- 14b. Lower glume of the sessile spikelet weakly to strongly concave (rarely with a medial groove in *Schizachyrium*).
- 15a. Upper lemma of sessile spikelet awned (awn vestigial in some forms of *S. tenerum*) from a deeply lobed apex; lower glume of sessile spikelet acute to acuminate *Schizachyrium*
- 15b. Upper lemma of sessile spikelet awnless; lower glume of sessile spikelet bidentate (teeth sometimes minute in *E. muticus*) *Elionurus*
- 11b. Racemes 2–several per peduncle or spatheate sheath.
- 16a. Sessile spikelet with a sharp, needlelike callus and a stout twisted awn.
- 17a. Lower glume of pedicellate spikelet foliaceous, 6–9 mm long, distinctly 10–15-nerved, the margins membranous; sessile spikelet cartilaginous, with a longitudinal groove *Agenium*
- 17b. Lower glume of pedicellate spikelet not foliaceous, 4–6 mm long, indistinctly 3–8-nerved, the margins firm; sessile spikelet concave, sulcate, or grooved.
- 18a. Upper glume of the sessile spikelet with an awn 1–5 mm long *Andropogon*
- 18b. Upper glume of sessile spikelet awnless or with an awn less than 1 mm long *Hyparrhenia*
- 16b. Sessile spikelet with a blunt or rounded callus, awned or awnless.
- 19a. Rachis internodes and pedicels with a thin, translucent line running lengthwise between 2 strong nerves; lower glume of the sessile spikelet concave or flat *Bothriochloa*
- 19b. Rachis internodes and pedicels terete or flat, lacking a thin translucent line running lengthwise between 2 strong nerves; lower glume of sessile spikelet sulcate between 2 strong lateral keels *Andropogon*

KEY IV

Disarticulation above the persistent glumes (glumes and lemmas falling in some species of *Eragrostis* but then the palea and rachilla persistent); spikelets 1–many-flowered.

- 1a. Lemmas bearing 3–26 awns, the awns sometimes united below to form a column but then distinctly tripartite above.
- 2a. Awns 10–26, not united above to form a column, stout, unequal in length *Pappophorum*
- 2b. Awns 3, distinct or united below to form a column, slender, equal or unequal in length (rarely the lateral awns reduced and inconspicuous) *Aristida*
- 1b. Lemmas awnless or awned, but never with 3 or more awns arising from the same lemma.
- 3a. Spikelets unisexual, the plants monoecious, stamens 3–6; stoloniferous aquatics or grasses of marshy soils *Luziola*

- 3b. Spikelets bisexual; stamens 1–3; plants of various habits.
- 4a. Spikelets 1-flowered.
- 5a. Spikelets lacking a sterile rachilla internode prolonged past the base of the palea; lemma 1-nerved *Sporobolus*
- 5b. Spikelets with a minute sterile rachilla internode prolonged past the base of the palea; lemma 1–3-nerved.
- 6a. Inflorescence a digitate or subdigitate whorl of 1-sided spikes 3–10 cm long; lemma 3-nerved *Cynodon*
- 6b. Inflorescence a large, open, ovoid panicle 20–40 cm long; lemma 1-nerved *Eragrostis airoides*
- 4b. Spikelets 2–many-flowered, with reduced florets above or below fertile floret.
- 7a. Spikelets dorsally compressed; florets 2, the lower floret reduced (staminate or neuter), the upper floret bisexual.
- 8a. Lower glume with stout, tuberculate-based, golden hairs; inflorescence a false raceme; spikelets in triads at tips of flexuous branches arranged on a central axis *Loudetiopsis chrysothrix*
- 8b. Lower glume glabrous; inflorescence an open, branched panicle.
- 9a. Upper floret pubescent, 4–5 mm long, the lemma with an awn 10–20 mm long; perennial bunch grass *Loudetia flammida*
- 9b. Upper floret glabrous, 1–2 mm long, the lemma with an awn 1–13 mm long; caespitose or with short rhizomes, but not a bunch grass; foliage cauline *Arundinella hispida*
- 7b. Spikelets laterally compressed; florets 2–many, the lowest floret bisexual, the upper floret(s) bisexual, staminate, or neuter.
- 10a. Bisexual florets 3–15, all alike although the uppermost sometimes reduced or sterile.
- 11a. Inflorescence paniculate *Eragrostis*
- 11b. Inflorescence a spike or a panicle of spikes.
- 12a. Disarticulation at the base of the lowest floret, the florets falling together as a group *Dactyloctenium aegyptium*
- 12b. Disarticulation between the florets, the florets falling separately.
- 13a. Inflorescence a solitary, erect, or slightly arcuate spike *Tripogon spicatus*
- 13b. Inflorescence composed of 2–50 spikes or spikelike racemes.
- 14a. Inflorescence a single (occasionally 2) whorl(s) of 3–5 spikes *Eleusine indica*
- 14b. Inflorescence a panicle of spikes borne on an elongate axis.
- 15a. Glumes distinctly 3–6-nerved *Gouinia*
- 15b. Glumes 1-nerved *Leptochloa*
- 10b. Bisexual florets solitary (rarely 2 in *Gymnopogon*), with 1–3 reduced florets above.
- 16a. Inflorescence a solitary, erect spike *Microchloa indica*
- 16b. Inflorescence of 1–several whorls of digitate or subdigitate spikes or spikelike racemes.
- 17a. Foliage cauline, the blades lacking a midnerve *Gymnopogon*
- 17b. Foliage basal, or both basal and cauline, the blades with a midnerve.
- 18a. Plants stoloniferous perennials; upper floret absent or up to 0.5 mm long *Cynodon*
- 18b. Plants caespitose, perennial or annual; upper florets sterile or rarely fertile, well developed, 1–2 mm long.
- 19a. Upper glume bilobed, lemmas dark chestnut brown; upper florets oblong or club-shaped, the lower lemma ovate or broadly elliptic, usually awnless; foliage strictly equitant *Eustachys*
- 19b. Upper glume acute to acuminate, lemmas light brown to green; upper florets elliptic to ovate, more or less similar to the lower floret, the lower lemma usually awned; foliage not strictly equitant *Chloris*

KEY V

Spikelets disarticulating below the glumes (or the glumes vestigial in *Leersia* and *Oryza*); falling singly, without attached rachis internodes or pedicels; rachis and/or panicle branches generally persistent; spikelets with 1–2 florets.

- 1a. Spikelets laterally compressed.
- 2a. Spikelets 1-flowered; lemma and palea strongly scabrous; stamens 3–6; plants usually aquatic.
- 3a. Spikelets with only a lemma and a palea; plants stoloniferous *Leersia*
- 3b. Spikelets composed of 4 bracts, the fertile floret subtended by two glumelike bracts; plants caespitose or decumbent and rooting at the nodes *Oryza*
- 2b. Spikelets 2-flowered, the lower floret staminate or neuter, the upper floret bisexual; lemma and palea glabrous or pubescent but not strongly scabrous; stamens 3; plants terrestrial.

- 4a. Spikelets glabrous; foliage with abundant glandular hairs giving the plants a molasseslike odor when fresh *Melinis minutiflora*
- 4b. Spikelets pubescent; foliage glabrous or pubescent but lacking glandular, aromatic hairs.
- 5a. Glumes gibbous, densely pubescent, the callus densely pubescent with hairs 10–20 mm long *Rhynchelytrum repens*
- 5b. Glumes elliptic, glabrous, the callus pubescent with hairs 1–10 mm long *Arthropogon*
- 1b. Spikelets dorsally compressed (glumes keeled in *Ichnanthus*, *Mesosetum*, and *Oplismenus* but then the floret dorsally compressed), generally with 2 florets, the lower floret staminate or reduced, the upper floret bisexual.
- 6a. Spikelets paired, unequally pedicellate, the lower staminate and persistent, the upper perfect, disarticulating at the base of a pungent callus and provided with a long, stout, geniculate awn; inflorescence a solitary raceme or a conjugate pair of racemes *Trachypogon plumosus*
- 6b. Spikelets solitary, paired, or in groups of 3 or more, but not an unequally pedicellate pair of spikelets with the lower staminate and the upper perfect, the callus never pungent, awned or awnless but the awn never geniculate; inflorescence an open panicle or of 1–many racemes.
- 7a. Spikelets villous, the callus hairs more than 2 times the length of the glumes, the upper lemma hyaline *Imperata*
- 7b. Spikelets glabrous to pubescent but the hairs never more than 1.5 times the length of the spikelet, the upper lemma coriaceous to cartilaginous.
- 8a. Spikelets subtended by 1–10 bristles (at least apically on panicle branches); inflorescence a spicate panicle *Setaria*
- 8b. Spikelets not subtended by bristles; inflorescence various.
- 9a. Spikelets with an indurate knob at base, this composed of either a swollen pedicel or the first rachilla node and the reduced, adnate lower glume.
- 10a. Rachis foliaceous, winged, 2–8 mm wide; spikelets paired but arranged in a single row, with the backs of the upper lemmas of adjacent spikelets facing one another *Thrasya petrosa*
- 10b. Rachis triquetrous, 0.5–1 mm wide; spikelets paired, arranged in 2–4 regular or irregular rows, the spikelets secund or with the back of the upper lemmas facing the midrib, but not back to back *Eriochloa*
- 9b. Spikelets lacking an indurate knob at base.
- 11a. Upper lemma with a laterally flattened beak or truncate scar at apex.
- 12a. Glumes and lower lemma glabrous; upper lemma smooth; pedicels glabrous *Acroceras*
- 12b. Glumes and lower lemma coarsely hispid; upper lemma strongly rugose; pedicels with a ring of stout hairs at apex *Brachiaria paucispicata*
- 11b. Upper lemma blunt or acute but not with a laterally flattened beak or truncate scar at apex.
- 13a. Lemma of upper floret with a pair of appendages or scars at base.
- 14a. Appendages composed of dense tufts of thick hairs; upper floret sessile; foliage basal, the blades linear *Panicum olyroides*
- 14b. Appendages membranous wings or reduced to scars; upper floret on a short stipe, foliage cauline, the blades lanceolate to ovate.
- 15a. Inflorescence a panicle *Ichnanthus*
- 15b. Inflorescence of 1–5 racemes arranged on a central axis; frequently spikelets with a foliaceous first glume surpassing the spikelet *Echinolaena*
- 13b. Lemma of fertile floret lacking appendages or scars at base 16
- 16a. Inflorescence an open or contracted panicle.
- 17a. Both glumes equal in length and surpassing the floret; leaf blades with a short pseudopetiole *Homolepis aturensis*
- 17b. Lower glume lacking or from $\frac{1}{2}$ – $\frac{3}{4}$ the length of the spikelet; leaf blades with or without a pseudopetiole.
- 18a. Lower glume absent; spikelets densely pubescent *Leptocoryphium lanatum*
- 18b. Lower glume present; spikelets glabrous or pubescent.
- 19a. Palea of the lower floret splitting when mature, the two halves becoming reflexed and the spikelets appearing winged; fertile floret brown and shining when mature *Otachyrium versicolor*
- 19b. Palea of the lower floret not splitting, the spikelets not appearing winged; spikelets variously colored.
- 20a. Spikelets placed obliquely on pedicels, black at maturity, the glumes and lower lemma with tufts of hairs at apices *Lasiacis*
- 20b. Spikelets not placed obliquely on pedicels, more or less erect, variously colored at maturity, the glumes and lower lemma glabrous or pubescent but not with tufts of hairs at apices.
- 21a. Inflorescence a narrow, contracted, spicate panicle.
- 22a. Culms pithy; upper lemma leathery, the margins flat; plants stolon-

- iferous, floating aquatics or (in the dry season) rooted in the mud along the margins of streams and ponds *Hymenachne*
- 22b. Culms hollow; upper lemma cartilaginous, the margins inrolled or flat; plants caespitose or decumbent, of humid habitats but never floating aquatics *Sacciolepis*
- 21b. Inflorescence open or contracted, if somewhat spicate then with fewer than 25 spikelets.
- 23a. Spikelets inflated, subglobose; upper lemma strongly rugose; inflorescence of branched racemes with the back of the lower glume oriented towards the rachis *Brachiaria*
- 23b. Spikelets not inflated, ovate to narrowly elliptic; upper lemma smooth (rugose in *P. maximum*); if the inflorescence somewhat racemose then spikelets neither inflated nor the lemmas rugose *Panicum*
- 16b. Inflorescence of 1-many racemes.
- 24a. Spikelets subaristate to awned.
- 25a. Blades ovate to lanceolate, less than 3 times as long as wide; awns arising from the bidentate tips of both glumes and the lower lemma *Oplismenus*
- 25b. Blades linear, more than 5 times as long as wide; lower glume mucronate but not awned or aristate, the upper glume and/or the lower lemma awned *Echinochloa*
- 24b. Spikelets not awned.
- 26a. Inflorescence a solitary raceme.
- 27a. Raceme with a single row of paired spikelets oriented back to back, so that the lower glumes of each pair face each other and the upper glumes face apart; rachis foliaceous, winged *Thrasya*
- 27b. Raceme with solitary or paired spikelets not oriented back to back; rachis winged or not.
- 28a. Lower glume lacking; spikelets oriented with the back of the fertile lemma towards the rachis *Paspalum*
- 28b. Lower glume well developed; spikelets oriented with the back of the upper lemma away from the rachis.
- 29a. Spikelets distichous, arranged in 2 rows spreading at 180°; glumes and lower lemma pubescent with stiff, golden, or reddish hairs
..... *Mesosetum cayennensis*
- 29b. Spikelets secund, arranged in 2 or 4 rows but on the lower side of the rachis; glumes and lower lemma glabrous or pubescent with soft, white hairs *Brachiaria*
- 26b. Inflorescence of 2-many conjugate, digitate, or paniculate racemes.
- 30a. Ligules absent; spikelets subglobose *Echinochloa*
- 30b. Ligules present, membranous or ciliate; spikelets elliptic to subglobose.
- 31a. Margins of the upper lemma indurate, inrolled, clasping the back of the palea, or (rarely) the floret open.
- 32a. Lower glume well developed, 1-3-nerved, $\frac{1}{4}$ - $\frac{3}{4}$ the length of the spikelet.
- 33a. Spikelets narrowly elliptic, secund, irregularly arranged on short branches *Panicum*
- 33b. Spikelets subglobose, appressed-ascending, regularly arranged in 2 or 4 rows with the back of the lower glume facing the rachis
..... *Brachiaria*
- 32b. Lower glume lacking or a minute nerveless scale less than $\frac{1}{5}$ the length of the spikelet.
- 34a. Lower glume a minute, nerveless scale; lower floret staminate, with a well-developed palea; lemma of the upper floret not clasping the palea, the floret open *Anthaenantiopsis trachystachyum*
- 34b. Lower glume absent; lower floret neuter, usually lacking a palea; lemma of the upper floret clasping the palea, the floret open only during anthesis.
- 35a. Back of the upper lemma facing away from the rachis; spikelets solitary *Axonopus*
- 35b. Back of the upper lemma facing toward the rachis; spikelets solitary or paired *Paspalum*
- 31b. Margins of the upper lemma hyaline, lying flat against the back of the palea.
- 36a. Plants floating aquatics or (in the dry season) rooted in the mud along the margins of streams and ponds, the culms solid with aerenchymous tissue; blades clasping culm; lower glume well developed *Hymenachne*
- 36b. Plants not floating aquatics, the culms hollow; blades not clasping culm; lower glume either lacking or reduced to a small scale less than $\frac{1}{5}$ the length of the spikelet *Digitaria*

ENUMERATION OF GENERA AND SPECIES

Acroceras Stapf in Prain

Zuloaga, F. O., O. Morrone & A. A. Saénz. 1987. Estudio exomorfológico e histofoliar de las especies americanas del género *Acroceras* (Poaceae: Paniceae). *Darwiniana* 28(1-4): 191-217.

KEY TO SPECIES

- 1a. Apex of upper lemma with a stout, laterally compressed beak; pedicels ascending to appressed, borne on racemose panicle branches *A. zizanioides*
1b. Apex of upper lemma with a truncate, greenish scar, not beaked; pedicels spreading, the panicle open, its branches not racemose *A. excavatum*

A. excavatum (Henrard) Zuloaga & Morrone, *Darwiniana* 28(1-4): 195. 1987. *Panicum excavatum* Henrard, Feddes Repert. Spec. Nov. Regni Veg. 23: 179. 1926. *Lasiacis excavatum* (Henrard) L. Parodi, Notas Prelim. Mus. La Plata 8: 92. 1943.

Occasional in semideciduous forest, abundant in forest openings and logging roads; palatable (4); flowering January (*April*) to July; local name: *taquarilla*. Distribution: Venezuela, Brazil, Paraguay, and Argentina. (694, 830, 932, 967, 1001, 1740, 1891, 1966)

A. zizanioides (H.B.K.) Dandy, *J. Bot.* 69: 54. 1931. *P. zizanioides* H.B.K., *Nov. Gen. Sp.* 1: 100. 1816. *P. grandiflorum* Trin. ex Nees, *Agrost. Bras.* 143. 1829 (nomen nudum).

Occasional, seasonally inundated savannas and roadside ditches; flowering December to May; $2n = 36$; local name: *cañuela*. Distribution: Mex-

ico and the West Indies to northern Argentina; Bolivia: the Beni. (689, 998, 2414)

Actinocladum McClure

Soderstrom, T. R. 1981. Observations on a fire adapted bamboo of the Brazilian cerrado, *Actinocladum verticillatum* (Poaceae: Bambusoideae). *Amer. J. Bot.* 68(9): 1200-1211.

A. verticillatum (Nees) McClure ex Soderstrom, *Amer. J. Bot.* 68(9): 1201. 1981. *Arundinaria verticillata* Nees, *Agrost. Bras.* 2(1): 523. 1829. *Ludolphia verticillata* (Nees) A. Dietrich, *Sp. Pl.* 25. 1833. *Rhipidocladum verticillatum* (Nees) McClure, *Smithson. Contr. Bot.* 9: 106. 1973.

Usually reported as a *cerrado* species but in Chiquitania it is restricted to *campo rupestre* and adjacent transitional scrub; both rhizomes and culms appear to be extremely resistant to fire; locally abundant and forming extensive colonies in Parque Nacional "Noel Kempff Mercado." Distribution: central Brazil. (1378, 2759)

Agenium Nees in Lindl.

A. villosum (Nees) Pilger, Feddes Repert. Spec. Nov. Regni Veg. 43: 82. 1938. *Heteropogon villosus* Nees, *Agrost. Bras.* 362. 1829. *Andropogon neesii* Kunth, *Révis. Gramin.* 2(39). 1832, non Trinius, 1832. *Agenium nutans* Nees in Lindl., *Intr. Nat. Syst. Bot.* 2: 447. 1836. *Andropogon agenium* Steudel, *Syn. Pl. Glumac.* 1: 395. 1854.

Rare, *cerrado*; flowering in February and March; $2n = 20$. Distribution: Brazil, Paraguay, Uruguay, and Argentina; Bolivia: Andean Piedmont of Santa Cruz. (854, 2419)

Andropogon L.

KEY TO SPECIES

- 1a. Upper glume of the sessile and pedicellate spikelets aristate.
2a. Racemes 1/peduncle; upper glume of pedicellate spikelet enlarged and winglike; caespitose annuals *A. fastigiatus*
2b. Racemes 2/peduncle; upper glume of pedicellate spikelet not winglike; perennial bunch grasses.
3a. Callus of sessile spikelet pungent; culms slender, 1-2 mm in diameter; rachis internodes and pedicels 0.5-0.8 mm wide at the apex *A. angustatus*
3b. Callus of sessile spikelet blunt; culms 3-5 mm in diameter; rachis internodes and pedicels 1-1.5 mm wide at the apex *A. gayanus*
1b. Upper glume of sessile and pedicellate spikelets acuminate, acute, or minutely bidentate (subaristate in the pedicellate spikelet of *A. sanlorenzanus*).
4a. Culm abundantly branched at upper nodes to form a corymbose or elongate compound panicle of numerous (more than 30) spatheate inflorescences, each bearing 1-2(3) included or scarcely exerted racemes.

- 5a. Racemes 1/spatheate inflorescence; pedicellate spikelet well developed and staminate at all the nodes of the raceme.
 6a. Rachis internodes and pedicels ciliate; sessile spikelet bisexual *A. insolitus*
 6b. Rachis internodes and pedicels glabrous; sessile spikelet pistillate *A. virgatus*
 5b. Racemes 2-3/spatheate inflorescence; pedicellate spikelet staminate at terminal rachis nodes but vestigial below.
 7a. Sessile spikelets awnless; racemes straight; panicles corymbose *A. bicornis*
 7b. Sessile spikelets awned; racemes flexuous; panicles elongate *A. glaziovii*
 4b. Culms branched or unbranched but not forming a compound panicle; racemes (2)3-6 per sheath, digitate; if inflorescences numerous (10-25 in some variants of *A. lateralis*) then clearly exerted.
 8a. Pedicellate spikelets well developed, subequaling or surpassing the sessile spikelet in length.
 9a. Culms freely branched at the middle and upper nodes, 150-200 cm tall, 5-30 inflorescences/culm *A. lateralis*
 9b. Culms unbranched or sparsely branched, 30-40 cm tall, 1-3 inflorescences/culm.
 10a. Sessile spikelet awnless, 5-5.5 mm long; racemes 4-6/peduncle; culms with 2-3 inflorescences borne at the upper nodes; pedicellate spikelets staminate, 6 mm long *A. sanlorenzanus*
 10b. Sessile spikelet awned, 4-4.5 mm long; racemes 3 per peduncle; culms unbranched, bearing a single terminal inflorescence; pedicellate spikelets neuter (rarely staminate), 3-4 mm long *A. carinatus*
 8b. Pedicellate spikelets vestigial, up to 1/4 the length of the sessile spikelet.
 11a. Sessile spikelets awned; rachis hairs equaling the sessile spikelet; mature culms with a single, terminal inflorescence *A. macrothrix*
 11b. Sessile spikelets awnless; rachis hairs twice the length of the sessile spikelet; mature culms with 2-3 terminal and axillary inflorescences.
 12a. Racemes 3-5; leaf blades 3-5 mm wide, carinate at apex; spikelets 3-5 mm long; plants loosely caespitose, the culms somewhat geniculate *A. selloanus*
 12b. Racemes 2-3; leaf blades 1-3 mm wide, acuminate; spikelets 2.5-3.5 mm long; plants densely caespitose, the culms erect *A. leucostachyus*

A. angustatus (C. Presl) Steudel, Syn. Pl. Glumac. 1: 370. 1854. *Diectomis laxa* Nees, Agrost. Bras. 340. 1829, non *A. laxus* Willd., 1806. *D. angustata* C. Presl, Rel. Haenk. 1: 333. 1830.

Occasional, seasonally humid savanna and in white sandy soils on valley-side *campos* (upslope); flowering February to (April) May; meiosis abnormal, plants probably apomictic. Distribution: Mexico and the West Indies to Brazil. (886, 960, 2078, 2459)

A. bicornis L., Sp. Pl. 1046. 1753.

Occurring in a wide range of natural and disturbed habitats; occasional in seasonally inundated savannas, *cerrado*, and forest margins; abundant in old fields and along most roadsides in savanna and forest soils; unpalatable (2); flowering November to (January to March) May. Distribution: Mexico to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Cochabamba, Beni, and the Yungas. (626, 672, 682, 1555)

A. carinatus Nees, Agrost. Bras. 2: 330. 1829. *A. carinatus* var. *leiophyllus* Hack. in A. DC., Monogr. Phan. 6: 434. 1889, *A. carinatus* var. *exserens* Hack. in Mart., Fl. Bras. 2(3): 288. 1883.

Poorly represented in herbaria but locally abundant in *campo rupestre* on Serranía de Santiago; flowering is dependent upon fire. Distribution: Costa Rica and Brazil. (2790)

A. fastigiatus Sw., Prodr. 26. 1786. *Diectomis fastigiata* (Sw.) P. Beauv., Ess. Agrostogr. 132: 160. 1812.

Occasional, in superficial soils on lateritic crests and granitic outcrops, locally abundant as a weed along road embankments in savanna soils; flowering November to (April) May; $2n = 20$. Distribution: throughout the tropics. (800, 1511, 1853, 2019, 2395)

A. gayanus Kunth, Révis. Gramin. 1: 163. 1829.

Cultivated forage grass of recent introduction by the British Mission in Tropical Agriculture (Patterson, 1984), usage not widespread; two different populations observed to flower in November and April. (1409A, 1964)

A. glaziovii Hack. in Mart., Fl. Bras. 2(3): 286. 1883.

Poorly represented in herbaria but abundant in Chiquitania, codominant with *Saccharum trinii* and *Arundinella hispida* in savanna marsh; coarse and

unpalatable (0); flowering in *May* and *June*. Distribution: central Brazil. (983, 2031, 2082)

A. insolitus Sohns, Mem. New York Bot. Gard. 9(3): 271. 1957.

Closely related to *A. virgatus* from which it is distinguished by ciliate pedicels and rachis internodes, more elongate racemes, and a bisexual sessile spikelet; reminiscent of *A. bicornis* and *Schizachyrium microstachyum*. Rare, savanna marsh; flowering in April. Distribution: Venezuela and Brazil; only the fifth known collection. (Killeen 2484; additional specimens examined: VENEZUELA: *Maguire & Wurdack* 3577 US, NY; *Davidse & González* 12710 MO. BRAZIL: *Harley et al.* 15771 MO; *Irwin* 8734 US)

A. lateralis Nees, Agrost. Bras. 329. 1829. *A. brevis* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 2: 268. 1832. *A. glaucescens* var. *lateralis* (Nees) Hack. in Mart., Fl. Bras. 2(3): 289. 1883. *A. incanus* Hack. in A. DC., Monogr. Phan. 6: 432. 1889.

Populations vary in stature, size of the sessile spikelet (3–5 mm), pedicellate spikelet (4–8 mm), and the length of the awn of the sessile spikelet. Closely related taxa of doubtful status are *A. hypogynus* Hack. (racemes 4–10), *A. coloratus* Hack. (awnless), *A. herzogii* Hack. (rachis and pedicels glabrous), and *A. lindmanii* Hack. ex Lindman (rachis and pedicels densely villous). This species is common in the sandy soils of seasonally humid savannas around San Ignacio de Velasco but is completely lacking from *cerrado* communities near Concepción, Lomerío, and San Javier, which are generally characterized by clay or sandy clay soils. Plants flower from August to January and blooming is possibly stimulated by fire. Distribution: Brazil, Paraguay, Argentina and Uruguay; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (754, 1114, 1246, 1550, 1662, 2295, 2819)

A. leucostachyus H.B.K., Nov. Gen. Sp. 1: 187. 1816. *A. lanuginosa* H.B.K., Nov. Gen. Sp. 1: 187. 1816.

Rare in Chiquitania, as a weed of pastures, disturbed savannas, and roadsides; flowering is stimulated by fire. Distribution: Mexico and the West Indies to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Beni, and the Yungas. (1255, 1275, 1359, 1502, 2292, 2816; *Thomas* 5651 NY, LPB)

A. macrothrix Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 2: 270. 1832. *A. ternatus* subsp. *macrothrix* (Trin.) Hack. in Mart., Fl. Bras. 2(3): 287. 1883.

Similar to *A. ternatus* (Sprengel) Nees, which has fewer racemes (3 vs. 4–6), larger spikelets (5–6 mm vs. 4–5 mm), longer awns (2–2.5 cm vs. 1.5–2 mm), and more densely villous rachis internodes and pedicels. Rare, valley-side *campo* (midslope); flowering is stimulated by fire. Distribution: Brazil, Uruguay, and Argentina. (1869, 2195)

A. sanlorenzanus Killeen, sp. nov. TYPE: *Serranía de San Lorenzo*, 10 km W of San Javier, Prva. Ñuflo de Chávez, Dpto. Santa Cruz, Bolivia (16°15'S, 62°40'W), 800–900 m, 30 Oct. 1987, *Killeen* 2832 (holotype, ISC; isotypes, LPB, F, MO, US, SI). Figure 2.

A. carinatus Nees, affinis sed culmis 3–4 nodis, ramosis superne a 2–3 paniculis racemorum; racemis 3–5; basibus glumarum sulcatis valde, carinis ad medium contingentibus, carinis uninerviis; aristis vestigialibus apicem lemmatum 1.0–1.5 mm longis, nonexcurrentibus, spiculis muticis apparenter; spiculis pedicellatis 5.5–6.0 mm longis notabilis.

Caespitose, perennial bunch grass; culm glabrous, 30 cm tall, with 2–5 nodes visible above the basal foliage. Sheaths keeled, glabrous, strongly nerved, the margins membranous; ligules membranous, 0.2 mm long; blades broadest at base, equaling the sheath in width, folded, revolute when stressed, the adaxial surface glabrous with a thickened midrib, the abaxial surface pilose with an indistinct midnerve, 1–13 cm long, 2.4 cm wide (folded), reduced at the upper nodes. Inflorescences 2–3, terminal and axillary, inserted at the upper nodes, each composed of 4–6 digitate racemes 3–6 cm long; spikelets paired, sessile and pedicellate; rachis internodes 3 mm long, flattened, with cilia 2.5–3 mm long; pedicels similar, united with the sessile spikelet and the rachis internode at the base to form a bearded callus, the hairs 2 mm long; disarticulation below the glumes, the sessile spikelets falling attached to the rachis internodes and pedicels, the pedicellate spikelets falling separately. Sessile spikelets bisexual, 5 mm long; lower glume 5 mm long, bicarinate, the midnerve suppressed, each of the 2 keels composed of a single ridgelike nerve, strongly sulcate with the 2 keels reflexed and touching in the middle; upper glume 5 mm long, laterally compressed; lower lemma hyaline, 4.5–5 mm long, similar to the lower glume in form, ciliate on the margins, the lower palea lacking;

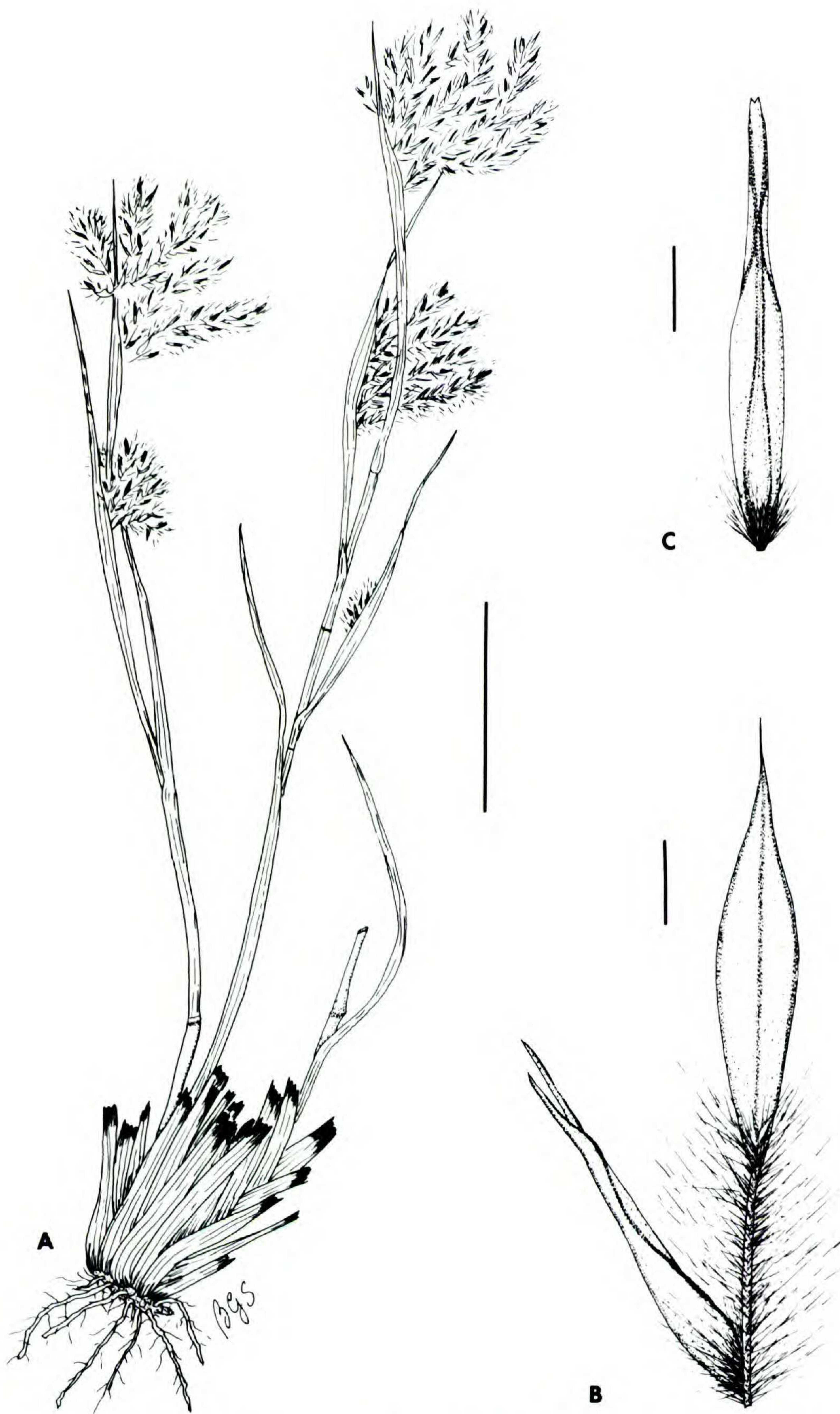


FIGURE 2. *Andropogon sanlorenzanus* (Killeen 2832).—A. Habit (bar = 5 cm).—B. Sessile and pedicellate spikelet pair.—C. Lower glume of the sessile spikelet (B and C: bar = 1 mm).

upper lemma 3.4 mm long, hyaline, with a vestigial awn 1.5 mm long arising between the 2 lobes, not exerted from the spikelets and only visible upon dissection, the palea minute; stamens 3, the anthers 2 mm long, yellow; lodicules truncate, fleshy. Pedicellate spikelet staminate, 5.5–6 mm long; lower glume as long as the spikelet, dorsally compressed, lanceolate, acuminate, chartaceous, 7-nerved, the

midnerve distinct, the lateral nerves submarginal; upper glume somewhat subequalling the spikelet, laterally compressed, lanceolate, acuminate, membranous, 1(3)-nerved; lower lemma 4 mm long, hyaline, lanceolate, ciliate on the margins, the palea 1.5 mm long, erose; stamens 3, the anthers 2.5 mm long, yellow.

This species is locally abundant in *campo rupestre* vegetation; flowering depends upon fire as the locality was visited on several occasions throughout the year and only those patches of savanna burned three to five weeks previously contained blooming individuals. The new species is similar to *A. carinatus* in life form, foliage, phenology, and habitat, but in *A. sanlorenzanus* the culm is branched to produce 2–3 (vs. 1) inflorescences, each with 4–6 (vs. 3) racemes, the sessile spikelet is 5–5.5 mm (vs. 4–4.5 mm) long, the awn of the upper lemma of the sessile spikelet is vestigial (vs. well developed), and the staminate pedicellate spikelet is 6 mm long (vs. neuter or rarely staminate and 3–4 mm long). Although collections are not numerous, these two species appear to be part of a variable complex in which widely separated and isolated populations have undergone considerable divergence.

A. selloanus (Hack.) Hack., Bull. Herb. Boissier, Sér. 2. 4: 266. 1904. *A. leuchostachyus* subsp. *selloanus* Hack. in A. DC., Monogr. Phan. 6: 420. 1889.

This species is widely distributed in natural savanna habitats with a range of water economies, from permanently humid savanna marsh to xeric gravel soils in *cerrado*, but it is zonally abundant as a codominant with *Paspalum stellatum* and *P. lineare* on valley-side *campos* (upslope); palatable (3); stimulated by fire, although populations also flower irregularly throughout the year. Distribution: Mexico and the West Indies to Argentina; Bolivia: the Andean Piedmont of Santa Cruz and the Beni. (522, 530, 577, 627, 709, 760, 1242, 1348, 1581, 1790, 1836, 2171, 2205, 2221, 2224, 2816)

A. virgatus Desv. in Ham., Prodr. Pl. Ind. Occ. 9. 1825. *Hypogynium virgatus* (Desv.) Dan-

dy, J. Bot. 69: 54. 1931. *H. spathiflorum* Nees, Agrost. Bras. 366. 1829. *A. spathiflorus* (Nees) Kunth, Enum. Pl. 1: 496. 1833.

The common variant of this species has contracted, corymbose, compound panicles with included peduncles; flowering in these populations is unaffected or retarded by fire. However, occasional populations have open, elongate compound panicles with exerted peduncles (2771, 2775); fire-stimulated flowering in these populations. Common, valley-side *campo*, seasonally inundated savanna, savanna marsh, and seasonal ponds; somewhat palatable (2); flowering November to (January, February, March) May; $2n = 20$. Distribution: Central America and the West Indies to northern Argentina; Bolivia: the Andean Piedmont of Santa Cruz and the Beni. (621, 625, 731, 1591, 1746, 1858, **2420**, 2771, 2775)

Anthaenantiopsis Mez

A. trachystachyum (Nees) Mez, Bot. Jahrb. Syst. 56(125): 11. 1921. *Panicum trachystachyum* Nees, Agrost. Bras. 125. 1829.

Locally abundant in *campo cerrado* with Chacoan influences 10 km N of Roboré; flowering depends upon fire. Distribution: Brazil and Paraguay. (2780)

Aristida L.

Henrard, J. T. 1926, 1927, 1928, 1933. "A Critical Revision of the genus *Aristida*." Meded. Rijks-Herb. 54(3 vols. & suppl.): 1–747. Henrard, J. T. 1929, 1932. "A monograph of the genus *Aristida*." Meded. Rijks-Herb. 58(2 vols.): 1–325. Caro, J. A. 1961. Las especies de *Aristida* (Gramineae) del centro de la República Argentina. Kurtziana 1: 123–206.

KEY TO SPECIES

- 1a. Margins of lemma inrolled on lower $\frac{1}{2}$, the floret grooved on the ventral surface.
 - 2a. Column less than 1 mm long, not twisted, the lemma grooved throughout; awns ascending.
 - 3a. Glumes equal to or surpassing the lemma (inclusive of column), acuminate or bidentate *A. circinalis*
 - 3b. Glumes $\frac{1}{2}$ – $\frac{3}{4}$ the length of the lemma (inclusive of column), blunt *A. succedanea*
 - 2b. Column 1–15 mm, twisted, only the lower $\frac{1}{2}$ of lemma grooved; awns ascending, recurved or spiral.
 - 4a. Column 10–15 mm long in mature specimens, separated from the lemma by an articulation point; awns spirally coiled; caespitose perennial bunch grass with long (to 1 m) setaceous leaf blades *A. macrophylla*
 - 4b. Column 1–3 mm long in mature specimens, articulation point absent (rarely present in some forms of *A. hassleri*); awns ascending or recurved; caespitose perennials, but not bunch grasses, the leaf blades 20–30 cm long, not setaceous.
 - 5a. Awns equal or subequal, recurved; leaf blades spirally coiled when senescent *A. hassleri*

- 5b. Lateral awns $\frac{1}{2}$ – $\frac{2}{3}$ the length of central awn, ascending; leaf blades not spirally coiled *A. gibbosa*
- 1b. Margins of the lemma overlapping, the floret not grooved on the ventral surface.
- 6a. Column 10–35 mm long.
- 7a. Callus bidentate *A. riparia*
- 7b. Callus not bidentate *A. megapotamica*
- 6b. Column absent or up to 5 mm long.
- 8a. Lower glume much longer than and obscuring the upper glume; foliage cauline *A. mendocina*
- 8b. Lower glume less than or equal to the upper glume, rarely slightly longer; foliage basal or cauline.
- 9a. Awns 7–10 cm long, filiform, purple; lower glume with 5 distinct nerves *A. venustula*
- 9b. Awns 0.5–3 cm long; lower glume 1–(3)-nerved.
- 10a. Lateral awns equal or nearly equal to the central awn.
- 11a. Awns distinctly spirally coiled; caespitose perennials, the culms 30–50 cm tall, sparsely branched *A. recurvata*
- 11b. Awns spreading to ascending; caespitose annuals, the culms 10–20 cm tall, freely branched *A. capillacea*
- 10b. Lateral awns $\frac{1}{2}$ – $\frac{2}{3}$ the length of central awn.
- 12a. Central awn arcuate, forming a half circle; panicles loosely contracted *A. torta*
- 12b. Central awn ascending, not arcuate; panicles open, lax *A. longifolia*

A. capillacea Lam., Tabl. Encycl. 1: 156. 1791.
A. elegans Rudge, Pl. Guian. 22. t. 30. 1805.

Occasional, in white sandy soil of valley-side *campos* (upslope) and superficial soil on granitic outcrops; growth is restricted to the dry season in seasonally humid habitats with exposed soil; flowering May to October. Distribution: Mexico to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Beni, and the Yungas. (958, 1130, 1249, 2107)

A. circinalis Lindman, Königl. Svenska Vetenska Acad. Handl. 34(6): 13. 1900. *A. leptochaeta* Hack., Feddes Repert. Spec. Nov. Regni Veg. 6: 344. 1909. *A. rosacea* Mez, Feddes Repert. Spec. Nov. Regni Veg. 17: 151. 1921.

Similar to and possibly not distinct from *A. succedanea* Henrard and *A. aristiglumis* Caro. Rare in sandy soils near Roberé; flowering is apparently stimulated by (but not dependent upon) fire; August to January. Distribution: Argentina, Paraguay, and Uruguay; Bolivia: Andean Piedmont of Santa Cruz, Gran Chaco, and the Yungas. (740, 1120, 1243, 1278, 1544, 1569, 2809)

A. gibbosa (Nees) Kunth, Enum. Pl. 1(1): 189. 1833. *Chaetaria gibbosa* Nees, Agrost. Bras. 383. 1829.

Rare, superficial soils on granitic outcrops in *campo rupestre* on Serranía de San Lorenzo; flowering in April. Distribution: central Brazil. (1979)

A. hassleri Hack., Bull. Herb. Boissier, Sér. 2, 4(3): 277. 1904. *A. longiramea* Presl. var.

boliviana Henrard, Meded. Rijks-Herb. 40: 56. 1921. *A. hassleri* Hack. var. *aculeolata* Hack., Feddes Repert. Spec. Nov. Regni Veg. 7: 373. 1909.

Rare, superficial soils over granitic outcrops; unpalatable (0); flowering November to January. Distribution: Paraguay. (820, 1221, 1544)

A. longifolia Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1: 84. 1831. *A. bromoides* Salz. ex Trin. & Rupr., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 7(1): 118. 1842, non H.B.K., 1816.

Rare, sandy soils in *cerrado* (Santiago de Chiquitos) and the Gran Chaco; flowering in May. Distribution: Venezuela, Colombia, and Brazil; Bolivia: the Beni. (1271, 2783)

A. macrophylla Hack., Denkschr. Kaiserl. Akad. Wiss. Math. Naturwiss. Kl. 79: 16. 1906. *A. subarticulata* Mez, Feddes Repert. Spec. Nov. Regni Veg. 17: 148. 1921.

Henrard (1927) cited *A. hassleri* var. *aculeolata* Hack. as a synonym based on the presence of an articulation point at the apex of the lemma; however, the type specimen (*Hassler 9849*, fragment US) has spikelets with reflexed rather than contorted awns and is better treated as a variety of *A. hassleri* Hack. Henrard (1927) also cited *A. endomellas* Mez as a synonym of *A. macrophylla* but the type (*Hassler 11323*, fragment US) lacks both an articulation point and contorted awns. Common in *cerrado*; the foliage is coarse and unpalatable (0); flowering January to (February) April;

$2n = 22$. Distribution: central Brazil. (794, 852, 1805, 1841, 1893, 1995, **2392**)

A. megapotamica Spreng., Syst. Veg. 16(4): 31. 1827. *A. implexa* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 4(1): 48. 1836. *A. paraguayensis* Lindman, Köngl. Svenska Vetensk. Akad. Handl. 34(6): 14. 1900. *A. sellowii* Mez, Feddes Repert. Spec. Nov. Regni Veg. 17: 148. 1921.

Not yet collected in Chiquitania; rare in sandy well-drained soils of the Andean Piedmont of Santa Cruz; flowering in January. Distribution: Brazil, Paraguay, Uruguay, and Argentina. (1562)

A. mendocina Philippi, Anales Univ. Chile 36: 205. 1870. *A. cordobensis* Hack. in Stuck., Anales Mus. Nac. Hist. Nat. Buenos Aires 11: 91. 1904. *A. inversa* Hack. in Fries, Ark. Bot. 8: 37. 1908. *A. mendocina* var. *macrantha* (Parodi) Henrard, Meded. Rijks-Herb. 54a: 267. 1927.

Rare, in sandy soils; unpalatable (0); flowering from January to August. Distribution: Argentina and Chile; Bolivia: Andean Piedmont of Santa Cruz, where it is commonly found as a colonizer on sand dunes. (927, 1042, 1119, 1265, 1272, 1570, 1726, 2500)

A. recurvata H.B.K., Nov. Gen. Sp. 1: 123. 1816. *A. riedeliana* Trin. & Rupr., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 7(1): 113. 1842. *A. neesiana* Trin. & Rupr., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 7(1): 113. 1842.

Occasional, gravel soils and lateritic crests in *cerrado*; unpalatable (0); flowering April to July. Distribution: Central America, Venezuela, and Brazil. (907, 1019, 1907, 2008, 2049, 2097)

A. riparia Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 6: 48. 1836. *A. implexa* var. *aequa* Trin. & Rupr., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 7: 124. 1842.

Common, in *cerrado* and *campo rupestre*; the foliage is coarse and shows no evidence of selective grazing, but the species is less abundant in overgrazed savannas, unpalatable (1–2); flowering January to (April) June; $2n = 22$. Distribution: Ven-

ezuela, the Guianas, Brazil, and Paraguay; Bolivia: the Yungas. (697, 726, 759, 910, 1168, 1830, 1837, 1954, 1983, 2000, 2016, 2060, **2422**)

A. succedanea Henrard, Med. Rijks-Herb. 58A: 294, pl. 144. 1932.

Common, *cerrado*; unpalatable (0) except after being burned; flowering is stimulated but not dependent upon fire, August to January; $2n = 22$. Distribution: central Brazil. (545, 1103, 1167, 1193, 1367, 1558, 2115, **2242**, 2778)

A. torta (Nees) Kunth, Révis. Gramin. 1: 190. 1830. *Chaetaria torta* Nees, Agrost. Bras. 386. 1829. *A. spadicea* sensu Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 4(1): 43. 1836, auct. non H.B.K., 1816. *A. tinctoria* Trin. & Rupr., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 7(1): 111. 1842. *A. breviglumis* Mez, Feddes Repert. Spec. Nov. Regni Veg. 17: 152. 1921.

Not yet collected in Chiquitania but common along trails in shallowly inundated savannas in the Beni. Distribution: Venezuela, the Guianas, and Brazil. (2602)

A. venustula Arechav., Anales Mus. Nac. Montevideo 4(1): 77. 1902. *Chaetaria pallens* var. *tenuifolia* Nees, Agrost. Bras. 381. 1829. *A. pallens* var. *tenuifolia* (Nees) Trin. et Rupr., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 7(1): 116. 1842. *A. pallens* var. *genuina* f. *breviaristata* Hack., Anales Mus. Nac. Hist. Nat. Buenos Aires 21: 69. 1911.

Not yet collected in Chiquitania; flowering is stimulated by fire. Distribution: Brazil, Paraguay, Uruguay, and Argentina; Bolivia: Andean Piedmont of Santa Cruz. (1240)

Arthropogon Nees

Filgueras, T. S. 1982. Taxonomia e distribuição de *Arthropogon* Nees (Gramineae). Bradea 3(36): 303–322.

KEY TO SPECIES

- 1a. Callus hairs 2–4 mm long; lower glume 0–10 mm long (including awn); panicle pyramidal *A. villosus*
- 1b. Callus hairs 0.5–1 mm long; lower glume 10–18 mm long (including awn); panicle narrowly elliptic *A. scaber*

A. scaber Pilger & Kuhlmann. in Kuhlmann, Comiss. Linhas Telegr. Estratég. Mato Grosso Amazonas 67, Anexo 5, Bot. 11: 37. 1922. *A. bolivianus* Filgueiras, Brittonia 38(1): 71. 1986.

Rare, Santiago de Chiquitos. Distribution: central Brazil. (Cutler 7023)

A. villosus Nees, Agrost. Bras. 319. 1829. *A. villosus* Nees var. *glabrescens* S. Moore, Trans. Linn. Soc. London, Bot. 4: 508. 1895.

Uncommon, forming lawnlike colonies in *cerrado*, locally abundant in the hill region SE of San Javier; palatable (3); flowering is dependent upon fire. Distribution: central Brazil. (1112, 1178)

Arundinella Raddi

A. hispida (Willd.) Kuntze, Revis. Gen. Pl. 2: 761. 1891. *Andropogon hispidus* Humb. & Bonpl. ex Willd., Sp. Pl. 4: 908. 1806. *Goldbachia mikanii* Trin. in Sprengel, Neue Entdeck 2: 42. 1821. *Arundinella brasiliensis* Raddi, Agrost. Bras. 37. 1823. *Piptatheria confine* Schultes, Mant. 2: 184. 1824. *A. mikanii* (Trin.) Nees, Agrost. Bras. 465. 1829.

A. confinis (Schultes) Hitchc. & Chase, Contr. U.S. Natl. Herb. 18: 290. 1917.

Abundant as a codominant of savanna marsh with *Saccharum trinii*, occasionally in seasonally inundated savanna and valley-side *campo* (down-slope), and a single population (2096) was collected in well-drained soils on a *cerrado*/forest margin; flowering January to (May) July. Distribution: Mexico to Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (843, 920, 980, 1593, 2021, 2038, 2088, 2096, 2593)

Arundo L.

A. donax L., Sp. Pl. 81. 1753.

Cultivated in Roboré for ornament and, presumably, roof construction.

Axonopus P. Beauv.

Black, G. A. 1963. Grasses of the genus *Axonopus* (a taxonomic treatment). L. B. Smith (editor), Advancing Frontiers of Plant Sciences 5: 1–186. Garófalo-Spalding, B. 1988. Systematics of the genus *Axonopus* section *Cabrera* (Gramineae, Paniceae). Masters Thesis, Iowa State Univ., Ames, Iowa.

KEY TO SPECIES

- 1a. Rachis pubescent with papillose-based hairs.
 - 2a. Rachis hairs white, softly pilose or a mixture of many white hairs with a few stout golden hairs subtending spikelets.
 - 3a. Spikelets 2–2.5 mm long, appressed to rachis, at least some subtended by a few golden hairs *A. herzogii*
 - 3b. Spikelets 3–5 mm long, divergent from rachis, golden hairs absent *A. brasiliensis*
 - 2b. Rachis hairs golden, stout; white hairs absent.
 - 4a. Spikelets sunken into cavities of a thickened rachis 0.8–1.5 mm wide; apex of rachis prolonged, naked *A. chrysolepharis*
 - 4b. Spikelets not sunken in cavities, the rachis 0.4–0.7 mm wide, bearing spikelets to the apex.
 - 5a. Spikelets glabrous, 1.2–1.4 mm long *A. exasperatus*
 - 5b. Spikelets pubescent, 1.2–2.0 mm long.
 - 6a. Spikelets 1.6–2.0 mm long; racemes 4–7 mm long; leaf blades 4–6 mm wide and 8–14 cm long *A. canescens*
 - 6b. Spikelets 1.3–1.7 mm long; racemes 8–12 mm long; leaf blades 2–3 mm wide and 4–8 cm long *A. pulcher*
 - 1b. Rachis scabrous or glabrous, lacking papillose-based hairs.
 - 7a. Midnerve of glume and lower lemma distinct; leaf blades involute and setaceous-tipped; robust caespitose bunch grasses *A. barbigerus*
 - 7b. Midnerve of glume and lower lemma suppressed (if developed, then weak when compared with lateral nerves); foliage usually compressed; never robust bunch grasses, often stoloniferous.
 - 8a. Upper floret brown.
 - 9a. Racemes 5–10 cm long; glume and lower lemma equaling the upper floret *A. cuatrecasarii*
 - 9b. Racemes 15–30 cm long; glume and lower lemma surpassing the upper floret by 0.5–1 mm.
 - 10a. Innovations extravaginal; upper lemma with a tuft of white hairs at apex *A. paranaensis*
 - 10b. Innovations intravaginal; upper lemma glabrous at apex *A. leptostachyus*
 - 8b. Upper floret stramineous.
 - 11a. Glume and lower lemma with stiff marginal hairs; spikelets 2.5–3 mm long *A. marginatus*
 - 11b. Glume and lower lemma glabrous or sparsely pilose, the hairs not stiff; spikelets 1.5–2 mm long.
 - 12a. Leaf blades linear-lanceolate, 5–10 mm wide, flat, not folded *A. compressus*
 - 12b. Leaf blades linear, 2–3(–5) mm wide, folded *A. fissifolius*

A. barbigerus (Kunth) Hitchc. & Chase, Contr. U.S. Natl. Herb. 24: 433. 1947. *Paspalum barbatum* Nees ex Trin., Sp. Gram. 1(9): 98. 1827, non Schultes, 1827. *P. barbigerum* Kunth, Révis. Gramin. 1: 24. 1829. *A. barbatus* (Nees ex Trin.) Kuhl., Comiss. Linhas Telegr. Estraté. Mato Grosso Amazonas 67, Anexo 5, Bot. 11: 45. 1922. *A. eminens* var. *bolivianus* G. A. Black, Adv. Frontiers Pl. Sci. 5: 93. 1963. *A. pilosus* G. A. Black, Adv. Frontiers Pl. Sci. 5: 100. 1963. *A. perlongus* G. A. Black, Adv. Frontiers Pl. Sci. 5: 89. 1963.

This grass is part of a species complex, which includes *A. siccus* (Nees) Kuhl., which is less robust and had smaller inflorescences, *A. eminens* (Nees) G. A. Black, which has wider (1.5 cm) leaf blades, and *A. pellitus* (Nees ex Trin.) Hitchc. & Chase, which is characterized by densely hirsute foliage. Populations in Chiquitania vary for nodal pubescence, foliage scabrosity, length of blades, and inflorescence morphology; however, spikelet morphology is uniform for all populations sampled. An important constituent of *campo rupestre*, *cerrado*, *cerrado scrub*, seasonally inundated savanna, and valley-side *campos*; foliage is coarse and unpalatable (0). In general, plants in well-drained sites had longer, setaceous-tipped blades and flower later than populations growing in savanna wetland habitats. However, differences were not sufficient nor consistent enough to justify recognition of two separate taxa. All plants sampled had very low seed set (about 3%, 12 individual plants sampled in 3 populations) even though meiosis and pollen development appeared entirely normal. Populations in savanna wetlands flower October (*December*) to February, while populations in well-drained habitats bloom February (*March*) to May; $2n = 20$. Distribution: Brazil, Paraguay, Uruguay, and Argentina; Bolivia: Andean Piedmont and montane tropical savannas of Santa Cruz and the Beni. (705, 723, 753, 1501, 1518, 1663, 1839, 1976, 1986, **2266**, **2267**, 2381, **2399**)

A. brasiliensis (Sprengel) Kuhl., Comiss. Linhas Telegr. Estraté. Mato Grosso Amazonas 67, Anexo 5, Bot. 11: 47. 1922. *Eriochloa brasiliensis* Sprengel, Syst. Veg. 1: 249. 1825. *Paspalum dissitiflorum* Trin., Gram. Panic. 92. 1826. *Lappagopsis bijuga* Steudel, Syn. Pl. Glumac. 1: 112. 1854. *P. brasiliense* (Sprengel) Hack., Ergebn. Bot. Exped. Akad. Wiss. Sudbras. 7. 1906. *A. bijugus* (Steudel) Chase, Proc. Biol. Soc. Wash. 24: 136. 1911. *A. dissitiflorus* (Trin.) Chase, Proc. Biol. Soc. Wash. 24: 235. 1911.

Common, in *campo rupestre*; flowering is dependent upon fire. Distribution: Brazil and Paraguay. (1402, 2788, 2834)

A. canescens (Nees in Trin.) Pilger, Engl. & Prantl, Nat. Pflanzenf. ed. 2. 14: 55. 1940. *Paspalum canescens* Nees in Trin., Gram. Panic. 2: 89. 1826. *Panicum chrysodactylon* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 3(2): 197. 1835. *A. chrysodactylon* (Trin.) Kuhl., Comiss. Linhas Telegr. Estraté. Mato Grosso Amazonas 67, Anexo 5, Bot. pt. 11: 48. 1922.

Rare, in *cerrado* of hill region SE of San Javier; flowering in *March*. Distribution: Venezuela, Colombia, and Brazil. (2383)

A. chrysolepharis (Lag.) Chase, Proc. Biol. Soc. Wash. 24: 134. 1911. *Paspalum aureum* H.B.K., Nov. Gen. Sp. 1: 93, p. 27. 1816. *Cabrera chrysolepharis* Lag., Gen. Sp. Pl. 5. 1816. *Digitaria aurea* Sprengel, Syst. Veg. 1: 272. 1825. *P. savannarum* Schlecht., Linnaea 26: 132. 1853. *P. chrysolephare* (Lag.) Doell in Mart., Fl. Bras. 2(2): 114. 1877. *A. aureus* var. *pilosus* (Doell) Henrard, Blumea 4: 510. 1941.

A similar species, *A. excavatum* (Nees ex Trin.) Henrard, is an annual. Common, a characteristic species of *campo cerrado* where it grows in open spaces between large bunch grasses; unpalatable (0); flowering February to (*April*) May; $2n = 20$. Distribution: Central America to Paraguay; Bolivia: Andean Piedmont of Santa Cruz, Beni, and the Yungas. (874, 894, **1849**, 1957, 1992, 2011A, 2113, **2456**, 2591)

A. compressus (Sw.) P. Beauv., Ess. Agrostogr. 154. 1812. *Milium compressum* Sw., Prod. Veg. Ind. Occ. 24. 1788. *Paspalum platycaulon* Poir. ex Lam., Encycl. Suppl. 5: 34. 1804; see Black (1963) for a complete synonymy.

Common, as a weed of pastures and roadsides; occasionally forming colonies on forest/savanna margins; foliage palatable and resistant to trampling by cattle but unproductive and of limited value as a forage resource; flowering November to June. Distribution: throughout the tropics. (556, 652, 968, 1058, 1680, 1751)

A. cuatrecasasii G. A. Black, Adv. Front. Pl. Sci. 5: 147. 1963.

Rare in Chiquitania but common on the Andean Piedmont in sandy, well-drained savanna and scrub, often colonizing dunes; flowering January to May. Distribution: Venezuela and Colombia. (928, 1123, 1577, 1725, 2290)

A. exasperatus (Nees) G. A. Black, Adv. Front. Pl. Sci. 5: 168. 1963. *Paspalum aureum* sensu Trin., Sp. Gram. 1(9): 97. 1828, auct. non H.B.K., 1816. *Paspalum exasperatum* Nees, Agrost. Bras. 81. 1829, non *Panicum exasperatum* Nees ex Steudel, Syn. Pl. Glumac. 1: 62. 1854. *Panicum chrysolephare* Steudel, Syn. Pl. Glumac. 1: 62. 1855. *Panicum chrysites* Steudel, Syn. Pl. Glumac. 1: 38. 1855. *Paspalum chrysites* (Steudel) Doell in Mart., Fl. Bras. 2(2): 117. 1877. *A. aureus* P. Beauv. sensu Chase, Proc. Biol. Soc. Wash. IV: 135. 1911. *Paspalum carinatovaginatatum* Mez, Feddes Repert. Spec. Nov. Regni Veg. 15: 31. 1917. *A. chrysites* (Steudel) Kuhlman., Comiss. Linhas Telegr. Estratég. Mato Grosso Amazonas 67, Anexo 5, Bot. 11: 88. 1922. *A. minutus* Lucas, Bol. Soc. Venez. Cienc. Nat. 80: 22. 1953.

Several authors have treated *A. exasperatus* as a synonym of *A. aureus* P. Beauv.; however, the description given by Palisot de Beauvois (1812) applies equally well to several taxa within *Axonopus* sect. *Cabrera* and no type specimen of *A. aureus* has been located. Furthermore, Garófalo-Spalding (1988) found that Trinius (1828) misinterpreted Kunth's (Humboldt et al., 1816) description and plates of *Paspalum aureus*, which in fact conform to the presently accepted concept of *A. chrysolepharis*. The plant portrayed in Trinius's plates belongs to the taxon here treated as *A. exasperatus*. Subsequent authors have continued this error, and Garófalo-Spalding has proposed that the name *A. aureus* P. Beauv. be abandoned as a source of confusion. In other geographic regions *A. exasperatus* is reported from a variety of well-drained and wetland habitats, but in Chiquitania it is narrowly restricted to seasonally humid and shallowly inundated savannas; flowering December to (January) February. Distribution: Central America to Brazil; Bolivia: Andean Piedmont of Santa Cruz. (630, 686, 860, 1603, 1629, 1668, 1804)

A. fissifolius (Raddi) Kuhlman., Comiss. Linhas Telegr. Estratég. Mato Grosso Amazonas 67, Anexo 5, Bot. 11: 87. 1922. *Paspalum fissifolium* Raddi, Agrost. Bras. 26. 1823. *P.*

compressum var. *arenarium* Bertoni, Anales Ci. Parag. Ser. 2, 2: 153. 1918. *A. stragalus* Chase, Contr. U.S. Natl. Herb. 22: 472. 80. 1922. *A. affinis* Chase, J. Wash. Acad. Sci. 28: 180. 1938. *A. ater* Chase, J. Wash. Acad. Sci. 17: 143. 1927. *A. hirsutus* G. A. Black, Adv. Front. Pl. Sci. 5: 147. 1963.

Common, in valley-side *campo* (upslope) and seasonally humid or shallowly inundated savannas, rarely in superficial soil over granitic outcrops (then usually seasonally humid). This species is very palatable (4) and resistant to trampling by cattle; unlike most palatable grasses, it increases in abundance in overgrazed savannas. This is apparently due to an ability to form dense lawnlike colonies via the vigorous production of innovations and stolons, which allow it to colonize exposed soil surfaces. Colonies flower September to (November, December) March; $2n = 20$; local name: *grama*. Distribution: Central America to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Beni, and the Yungas. (600, 611, 614, 629, 642, 674, 684, 713, 773, 1347, 1364, 1531, 1576, 1624, **2253**, 2275, 2297)

A. herzogii (Hack.) Hitchc. Contr. U.S. Natl. Herb. 24: 431. 1927. *Panicum herzogii* Hack., Feddes Repert. Spec. Nov. Regni Veg. 7: 50. 1909.

Rare, apparently known only from the type locality at Cerro San Miserato near Santiago de Chiquitos and two localities in the adjacent Brazilian states of Mato Grosso and Rondônia. This taxon is intermediate to *A. brasiliensis* and *Axonopus* sect. *Cabrera*, of which *A. chrysolepharis*, *A. canescens*, *A. pulcher*, and *A. exasperatus* exist in Chiquitania; it is possibly a hybrid. (BOLIVIA. SANTA CRUZ: Cutler 7018 US; BRAZIL. MATO GROSSO: Pimenta Bueno to Riozinho, Kuhlmann 1722 US; Serra dos Parecis, Rosa 841 US.)

A. leptostachyus (Flügge) Hitchc., Contr. U.S. Natl. Herb. 22: 471. 1922. *Paspalum leptostachyum* Flügge, Monogr. Pasp. 122. 1810. *A. macrostachyus* Hitchc. & Chase, Contr. U.S. Natl. Herb. 18: 301. 1917.

Rare, seasonally humid savanna; flowering in January. Distribution: northern South America to Argentina. (1685)

A. marginatus (Trin.) Chase, Contr. U.S. Natl. Herb. 17: 226. 1913. *Paspalum marginatum* Trin., Gram. Panic. 90. 1826. *P. ery-*

throchaetum Mez, Feddes Repert. Spec. Nov. Regni Veg. 15: 32. 1917. *A. longecilius* (Hack.) L. Parodi, Notas Prelim. Mus. La Plata 3: 22. 1938.

Occasional, lateritic crests in *cerrado* and gravel soils of *campo rupestre*; flowering is dependent upon fire. Distribution: Brazil and Paraguay; Bolivia: the Yungas. (1138, 1200, 1389, 2229, 2789)

A. paranaensis L. Parodi ex G. A. Black, Adv. Front. Pl. Sci. 5: 168. 1963.

Rare, seasonally humid savanna; flowering in January. Distribution: Uruguay and Argentina. (1633)

A. pulcher (Nees) Kulhm., Comiss. Linhas Telegr. Estrateg. Mato Grosso Amazonas 67, Anexo 5, Bot. 11: 88. 1922. *Panicum pulchrum* Willd. ex Sprengel, Syst. Veg. 1: 272. 1825, nomen nudum. *Paspalum pulchrum* Nees, Agrost. Bras. 79. 1829. *Axonopus sprucei* (Doell) G. A. Black, Adv. Front. Pl. Sci. 5: 168. 1963.

Garófalo-Spalding (1988) treated this species as a variety of *A. canescens*. Sandy soil in *campo rupestre* (Serranía San Lorenzo); flowering in April. Distribution: Colombia, Venezuela, and Brazil. (1395, 1982)

Bambusa Schreber

B. vulgaris Schrader ex Wendl. var. **vittata** A. & C. Rivière, Bull. Soc. Natl. Acclim. France III. 5: 640. 1878. *B. vulgaris* var. *striata* (Lodd.) Gamble, Ann. Roy. Bot. Gard. (Calcutta) 7: 44. 1896.

KEY TO SPECIES

- 1a. Upper floret beaked, apex of pedicels with a ring of stout hairs *B. paucispicata*
1b. Upper floret not beaked, apex of pedicels glabrous or pubescent, lacking ring of stout hairs.
2a. Spikelets 2–3 mm long.
3a. Glumes and lower lemma glabrous, reticulately veined between the nerves; upper floret subglobose *B. lorentziana*
3b. Glumes and lower lemma hirsute, not reticulately veined; upper floret ovate *B. echinulata*
2b. Spikelets 4–6 mm long.
4a. Rachis about 1 mm wide *B. brizantha*
4b. Rachis about 2 mm wide.
5a. Glumes and lower lemma sparsely pubescent, at least at apex of upper glume; rhizomatous perennial *B. decumbens*
5b. Glumes and lower lemma glabrous; duration indefinite, decumbent and rooting at the nodes *B. plantaginea*

B. brizantha (Hochst. ex A. Rich.) Stapf in Prain, Fl. Trop. Africa 9: 531. 1919. *Panicum brizanthum* Hochst. ex A. Rich., Fl. Abyss. 2: 363. 1851.

Cultivated for ornament and construction material in Concepción and San Ignacio de Velasco; local name: *bambú*.

Bothriochloa Kuntze

Allred, K. W. & F. W. Gould. 1983. Systematics of the *Bothriochloa saccharoides* complex (Poaceae: Andropogoneae). Syst. Bot. 8(2): 168–184. de Wet, J. M. J. 1968. Biosystematics of the *Bothriochloa barbinodis* complex (Gramineae). Amer. J. Bot. 55: 1246–1250.

B. exaristata (Nash) Henrard, Blumea 4: 520. 1941. *Amphilophis exaristatus* Nash in J. K. Small, Fl. S.E. U.S. 65. 1903. *Andropogon hassleri* Hack., Bull. Herb. Boissier II. 4: 266. 1904. *A. saccharoides* var. *hassleri* Ekman, Ark. Bot. 11: 8. 1912. *B. hassleri* (Hack.) Henrard, Nederl. Dendrol. Ver. Gedenkb. Suringar 184. 1942.

Rare, valley-side *campo* (midslope); flowering in November. Distribution: southern Brazil, Paraguay, Uruguay, Argentina, and the southern United States. (1516)

Brachiaria (Trin.) Griseb.

Sendulsky, T. 1978. *Brachiaria*: taxonomy of cultivated and native species in Brazil. Hoehnea 7: 99–139. Parodi, L. R. 1969. Estudios sistematicos sobre las Gramineae–Paniceae argentinas y uruguayas. Darwiniana 15(1–2): 65–111.

A newly introduced cultivated perennial forage grass of African origin, which intergrades with *B. decumbens*; flowering January to April; local name: *bracherón*. (1704, 1963)

B. decumbens Stapf in Prain, Fl. Trop. Africa 9: 528. 1919. *Panicum eminii* Mez, Bot. Jahrb. 34: 135. 1904, non *P. eminens* Steudel, Syn. Pl. Glum. 1: 43. 1854. *B. eminii* (Mez) Robyns, Bull. Jard. Bruxelles 9: 176. 1932.

Although *P. eminii* Mez and *P. eminens* Steudel are not homonyms in the strict sense, they are sufficiently similar to be confused. Since *B. decumbens* is the traditional name for this widely cultivated forage grass, its usage is retained. This species attained wide popularity in the 1980s due to improved productivity compared with *Hyparrhenia rufa* (Patterson, 1984), but current cultivars have become susceptible to an insect pest (*salivaso*), and ranchers are diversifying their forage resources; flowering December to February. (618, 745, 1230, 1705)

B. echinulata (Mez) L. Parodi, Darwiniana 15(1-2): 94. 1969. *Panicum echinulatum* Mez, Notizbl. Bot. Gart. Berlin-Dahlem 7: 62. 1917. *P. echinulatum* var. *boliviense* Henrard, Meded. Rijks-Herb. 40: 50. 1921.

Rare, as a weed in pastures at San José de Chiquitos. Distribution: Argentina and Paraguay; Bolivia: the Yungas, Beni, and Tarija. (1699)

B. lorentziana (Mez) L. Parodi, Darwiniana 15(1-2): 99. 1969. *Panicum lorentziana* Mez, Bot. Jahrb. Syst. 56(125): 1. 1921. *P. velutinosum* Nees f. *violascens* Stuckert, Anales Mus. Nac. Hist. Nat. Buenos Aires 11: 75. 1904. *P. velutinosum* f. *viride* Stuckert, Anales Mus. Nac. Hist. Nat. Buenos Aires 11: 75. 1904.

Rare, as a weed along logging road in seasonal forest; flowering in March. Distribution: northern Argentina. (1887)

B. paucispicata (Morong) Clayton, Kew Bull. 42: 402. 1987. *Panicum paucispicatum* Morong, Ann. N.Y. Acad. Sci. 7: 262. 1893. *Acroceras paucispicatum* (Morong) Henrard, Blumea 3: 411-480. 1940.

Rare, in seasonally inundated swamps (*palmares*) dominated by *Copernicia alba* Morong, near San José de Chiquitos and the seasonally humid savannas of the Andean Piedmont; flowering in January. Distribution: Paraguay and the Gran Chaco of Argentina. (1585, 1707)

B. plantaginea (Link) Hitchc., Contr. U.S. Natl. Herb. 12: 212. 1909. *Panicum plantagi-*

neum Link, Hort. Berol. 1: 206. 1827. *P. leandri* Trin., Sp. Gram. 3(28): 335. 1835.

Rare, as a weed of gardens. Distribution: southern United States to northern Argentina. (1810)

Cenchrus L.

DeLisle, D. G. 1963. Taxonomy and distribution of the genus *Cenchrus*. Iowa State J. Sci. 37(3): 259-351. Filgueras, T. S. 1984. O gênero *Cenchrus* no Brasil (Gramineae; Panicoideae). Acta Amazonica 14(1, 2): 95.

KEY TO SPECIES (PLUS A SUPERFICIALLY SIMILAR SPECIES OF *PENNISETUM*)

- 1a. Inner whorl of spines united for $\frac{1}{2}$ - $\frac{3}{4}$ the length of bur.
 - 2a. Involucre a flattened inner whorl of spines and an outer whorl of free, terete bristles.
 - 3a. Outer bristles as long as the inner spines *C. brownii*
 - 3b. Outer bristles much shorter than the inner spines *C. echinatus*
 - 2b. Involucre composed of flattened spines only, which arise at irregular intervals ... *C. incertus*
- 1b. Inner whorl of spines or bristles connate only at base.
 - 4a. One bristle distinctly longer than the rest, the inner whorl finely ciliate
..... *Pennisetum ciliare*
 - 4b. All spines of equal length, scabrous
..... *C. myosuroides*

C. brownii Roemer & Schultes, Syst. Veg. 2: 258. 1817. *C. viridis* Sprengel, Syst. Veg. 1: 301. 1824.

Occasional as a weed in streets and yards of villages; flowering in June. Distribution: throughout the tropics. (976)

C. echinatus L., Sp. Pl. 1050. 1753. *C. pungens* H.B.K., Nov. Gen. Sp. 1: 115. 1816. *C. lechleri* Steudel in Lechl., Berberid. Amer. Austr. 56. 1857. *C. crinitus* Mez., Notizbl. Bot. Gart. Berlin-Dahlem 7: 48. 1917; see DeLisle (1963) for an extensive synonymy.

A rare weed in sandy soils of the Andean Piedmont; flowering in August. Distribution: southern United States to Argentina and the Pacific Islands; Bolivia: Andean Piedmont of Santa Cruz and the Yungas. (1118)

C. incertus M. A. Curtis, Bost. J. Nat. Hist. 1: 135. 1837. *C. pauciflorus* Benth., Bot. Voy. Sulph. 56. 1844. *C. muricatus* Philippi, Sert. Mend. Atl. 44. 1870, non L., 1771. *C. hu-*

milis Hitchc., Contr. U.S. Natl. Herb. 24: 488. 1927.

Rare, thorn scrub of the Gran Chaco. Distribution: Mexico and the West Indies to Argentina and Chile; Bolivia: Sorata and Tarija. (1281)

C. myosuroides H.B.K., Nov. Gen. Sp. 1: 115, pl. 35. 1816. *Pennisetum myosuroides* Sprengel, Syst. Veg. 1: 303. 1825. *C. alopecuroides* C. Presl, Rel. Haenk. 1: 317. 1835, non Thunb., 1794. *C. scabridum* Arechav., Anales Mus. Nac. Montevideo 1: 556. 1895.

Rare or overlooked roadside weed in sandy soils of the Gran Chaco. Distribution: southern United States to Argentina; Bolivia: Tarija and Cochabamba. (1313)

Chloris Sw.

Anderson, D. E. 1974. Taxonomy of the genus *Chloris* (Gramineae). Brigham Young Univ. Sci. Bull., Biol. Ser. 19(2): 1-133.

KEY TO SPECIES

- 1a. Margins of lemma long-ciliate above (hairs 2 mm long) and short-ciliate below (hairs 0.5 mm long); spikes 3-6(8) cm long *C. virgata*
1b. Margins of lemma uniformly long-ciliate (hairs 1.5-2 mm long); spikes 10-20 cm long
..... *C. dandyana*

C. dandyana C. D. Adams, Phytologia 21: 408. 1971. *Andropogon barbatum* L., Syst. Nat. ed. 10. 2: 1305. 1759. *Andropogon polydactylon* L., Sp. Pl. 2: 1483. 1763. *Chloris polydactyla* (L.) Sw., Prodr. 26. 1788. *C. consanguinea* Kunth, Révis. Gramin. 1: 89. 1829. *C. elata* Desv., Opusc. Sci. Phys. Nat. 73. 1831. *C. arundinacea* Nees ex Steudel, Syn. Pl. Glumac. 1: 207. 1854. *C. barbata* (L.) Nash, Bull. Torrey Bot. Club 25: 443. 1898. *C. polydactyla* f. *stolonifera* L. Parodi, Revista Argent. Agron. 20: 24. 1953.

Occasional roadside weed; flowering October to January. Distribution: United States to Argentina. (1238, 1268, 1311, 1692)

C. virgata Sw., Fl. Ind. Occ. 1: 203. 1797. *Chloris elegans* H.B.K., Nov. Gen. Sp. 1: 166. 1816.

Roadside weed, Gran Chaco; flowering in October. Distribution: throughout the tropics. (1269)

Chusquea Kunth

Clark, L. G. 1989. Systematics of *Chusquea* section *Swallenochloa*, section *Verticillatae*, and section *Serpentes* and section *Longifoliae* (Poaceae: Bambusoideae). Syst. Bot. Monogr. 27: 1-127.

C. ramosissima Lindman, Köngl. Svenska Vetensk. Akad. Handl. 34(6): 24. 1900. *C. phacellophora* Pilger, Notizbl. Bot. Gart. Berlin-Dahlem 8: 456. 1923.

Rare, liana in seasonal forest; vigorous growth noted in forest gaps; Rancho Zapoco 60 km SE of Concepción. Distribution: Brazil and Paraguay. (1529, 1530)

Coelorachis Brongniart

Veldkamp, J. F., R. de Koning & M. S. M. Sosef. 1986. Generic delimitation of *Rottboellia* and related genera (Gramineae). Blumea 31: 281-307. Quarín, C. L. 1979. Los géneros *Rhytachne* y *Coelorachis* (Gramineae) en Argentina. Kurtziana 12-13: 7-35. Clayton, W. D. 1970. Studies in the Gramineae 21. *Coelorachis* and *Rhytachne*: a study in numerical taxonomy. Kew Bull. 24: 309-314.

C. aurita (Steudel) A. Camus., Ann. Soc. Linn. Lyon 68: 197. 1922. *Rottboellia aurita* Steudel, Syn. Pl. Glumac. 1: 361. 1854. *Manisuris aurita* (Steudel) Kuntze, Revis. Gen. Pl. 3: 356. 1898. *Mnesithea aurita* (Steudel) Koning & Sosef, Blumea 31(2): 302. 1986.

Common, valley-side *campo*, seasonally inundated savanna, savanna marsh, and seasonal ponds; palatable (3); flowering November to (December, January, February) June; $2n = 18$. Distribution: Central America to Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (623, 624, 817, 1528, 1592, 1789, 2287)

Cynodon L. C. Rich.

de Wet, J. M. J. & J. R. Harlan. 1970. Biosystematics of *Cynodon* L. C. Rich. (Gramineae). Taxon 19: 565-569. Caro, J. A. & E. Sánchez. 1969. Los especies de *Cynodon* (Gramineae) de la República Argentina. Kurtziana 5: 191-252.

KEY TO SPECIES

- 1a. Spikelets 2.0-2.5 mm long; inflorescence a digitate whorl of 3-4 spikes 3-6 cm long
..... *C. dactylon*

- 1b. Spikelets 2.5–3.5 mm long; inflorescence a digitate whorl of 4–8 spikes 6–10 cm long
..... *C. nlemfuensis*

C. dactylon (L.) Pers., Syn. Pl. 85. 1805. *Panicum dactylon* L., Sp. Pl. 58. 1753. *C. maritimus* H.B.K., Nov. Gen. Sp. 1: 170. 1816. *C. pascuus* Nees, Agrost. Bras. 425. 1829. *C. erectus* C. Presl, Rel. Haenk. 1: 290. 1830.

An extremely variable taxon, Caro & Sánchez (1969) described numerous species, which are better viewed as varieties of this vegetatively reproducing species. Common as a weed in pastures and along roads; palatable (5), cultivated as forage for chickens and pigs; local name: *bremura*, *bremura costal*. Distribution: throughout the tropics; abundant along roadsides in the Gran Chaco. (741)

C. nlemfuensis Vanderyst, Bull. Agric. Congo. Belge 13: 342. 1922. *C. dactylon* (L.) Pers. var. *sarmentosus* L. Parodi, Revista Argent. Agron. 23: 185. 1956. *C. plectostachyus* sensu Caro & Sánchez, Kurtziana 5: 213. 1969.

KEY TO SPECIES

- 1a. Spikelets villous or densely pubescent, the hairs 1.5–10 mm long (at least at base of spikelet).
2a. Spikelet hairs 1.5 mm long (shorter at apex of glume and lower lemma); base of the plant invested with senescent sheaths of previous years' growth; innovations intravaginal; culms unbranched, 0–1 nodes visible above the basal foliage *D. neesiana*
2b. Spikelet hairs 5–10 mm long; base of plant not shrouded by senescent sheaths; foliage cauline (at least at maturity); innovations extravaginal; culms freely branched, 3–6 nodes visible above the basal foliage *D. insularis*
- 1b. Spikelets glabrous, short-pubescent or ciliate, the hairs, when present, less than 0.5 mm long.
3a. Upper floret dark reddish brown; spikelets borne in triads; racemes inserted on an elongate axis.
4a. Spikelets 2–2.5 mm long, obovate; pubescence of glumes and lower lemma conspicuously and uniformly of short, glandular-tipped hairs *D. mattogrossensis*
4b. Spikelets 1–1.8 mm long, lanceolate; pubescence of glumes and lower lemma in lines between margins, not glandular.
5a. Racemes 3–8(10); spikelets 1.5–1.8 mm long *D. fragilis*
5b. Racemes (8)10–30; spikelets 1–1.3 mm long *D. lehmanniana*
- 3b. Upper floret lead-colored, green, or tan; spikelets borne in pairs; racemes conjugate or digitate.
6a. Racemes 2, conjugate; plants stoloniferous *D. fuscescens*
6b. Racemes 2–many, digitate at 1 or 2 nodes; plants of indefinite duration, decumbent and rooting at the nodes.
7a. Lower glume lacking.
8a. Upper glume and lower lemma glabrous; upper glume equaling upper floret *D. lanuginosa*
8b. Upper glume and lower lemma ciliate; upper glume about ½ the length of upper floret *D. setigera*
- 7b. Lower glume present.
9a. Spikelets dimorphic, the pedicellate spikelet with stiffly spreading marginal hairs, the hairs lacking on sessile spikelet *D. bicornis*
9b. Spikelets all alike, the pedicellate and sessile spikelet both with ascending marginal hairs *D. ciliaris*

D. bicornis (Lam.) Roemer & Schultes, Syst. Veg. 2: 470. 1817. *Paspalum bicorne* Lam., Tabl. Encycl. 1: 176. 1791. *Syntherisma sanguinalis* sensu Hitchc., Contr. U.S. Natl.

Cultivated forage grass, not widely planted in Chiquitania but common in the Gran Chaco; flowering November to May; local name: *estrella africana*. (978, 1387)

Dactyloctenium Willd.

D. aegyptium (L.) Willd., Enum. Pl. 1029. 1809. *Cynosurus aegyptius* L., Sp. Pl. 72. 1753. *D. mucronatum* (Michx.) Willd., Enum. Pl. 1029. 1809.

Rare, roadside weed. Distribution: throughout the tropics. (1700)

Digitaria Haller

Henrard, J. T. 1950. Monograph of the genus *Digitaria*. Univ. Pers. Leiden. Veldkamp, J. F. 1973. A revision of *Digitaria* Haller (Gramineae) in Malesia. Blumea 21: 1–80. Rugolo de Agrasar, Z. 1974. Las especies del género *Digitaria* (Gramineae) en la Argentina. Darwiniana 19(1): 65–171. Webster, R. D. 1987. Taxonomy of *Digitaria* section *Digitaria* in North America (Poaceae, Paniceae). Sida 12(1): 209–222.

Herb. 24(8): 425. 1927 (in part). *D. diversiflora* Swallen, Rhodora 65: 356. 1963.

Common, as a weed of pastures and roadsides in forest and *cerrado* soils; flowering throughout

the year. Distribution: pantropical. (1262, 1280, 1406, 1539, 1696)

D. ciliaris (Retz.) Koel., Descr. Gram. 27. 1802. *Panicum ciliare* Retz., Observ. Bot. 4: 16. 1786. *Panicum adscendens* H.B.K., Nov. Gen. Sp. 1: 80. 1816. *D. adscendens* (H.B.K.) Henrard, Blumea 1: 92. 1934. *Syntherisma sanguinalis* sensu Hitchc., Contr. U.S. Natl. Herb. 24(8): 425. 1927 (in part); see Veldkamp (1973) for extensive synonymy.

Common, as a weed of pastures and roadsides in forest and *cerrado* soils; rarely naturalized in superficial soils over granitic outcrops; flowering throughout the year. Distribution: throughout temperate and tropical regions of the New World. (603, 608, 678, 743, 1126, 1280, 1541, 1672, 1701, 2303)

D. fragilis (Steudel) Lucas, J. Wash. Acad. Sci. 32: 160. 1942. *Paspalum fragile* Steudel, Syn. Pl. Glumac. 1: 19. 1854.

Common along roads in *cerrado*; occasional on superficial gravel soils of granitic outcrops and lateritic crests; flowering October to December. Distribution: Venezuela and Colombia. (638, 798, 837, 1233, 1329, 1538, 1786)

D. fuscescens (C. Presl) Henrard, Meded. Rijks-Herb. 61: 8. 1930. *Panicum fuscescens* C. Presl, Rel. Haenk. 213. 1830. *Syntherisma fuscescens* (C. Presl) Scribner, Ann. Rep. Missouri Bot. Gard. 10: 49, t. 10. 1899.

Occasional as a weed in compacted gravel soils of road embankments; flowering January to February. Distribution: throughout the tropics. (786, 1661, 1734)

D. insularis (L.) Mez ex Ekman, Ark. Bot. 11: 17. 1912. *Andropogon insularis* L., Syst. Nat. ed. 10. 2: 1304. 1759. *Panicum leucophaeum* H.B.K., Nov. Gen. Sp. 1: 97. 1816. *Acicarpa sacchariflora* Raddi, Agrost. Bras. 31, pl. I, f. 4. 1823. *Trichachne insularis* (L.) Nees, Agrost. Bras. 87. 1829. *Trichachne sacchariflorum* (Raddi) Nees, Agrost. Bras. 87. 1829. *Leptocoryphium penicilligerum* Speg., Anales Soc. Ci. Argent. 16: 102. 1883. *Valota penicilligera* (Speg.) Chase ex L. Parodi, Revista Fac. Agron. Veterin. 4: 46. 1922. *Digitaria sacchariflora* (Raddi) Henrard, Blumea 1: 99. 1934.

Abundant, an aggressive weed along roads in savanna and forest; flowering in *November, De-*

ember, and irregularly throughout the year. Distribution: southern United States to Argentina. (595, 1388, 1405, 1571, 1695, 1730)

D. lanuginosa (Nees) Henrard, Meded. Rijks-Herb. 61: 5. 1930. *Paspalum lanuginosum* Nees, Agrost. Bras. 63. 1829. *D. laetevirens* Mez, Bot. Jahrb. Syst. 56(125): 8. 1921. *Panicum cuyabense* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 3: 206. 1835. *Syntherisma cuyabensis* (Trin.) Hitchc., Contr. U.S. Natl. Herb. 22: 468. 1922. *D. cuyabensis* (Trin.) L. Parodi, Physis 8: 378. 1926.

Rare, in seasonally humid sandy soils; flowering throughout the year. Distribution: the Guianas, Brazil, Paraguay, Argentina, and Uruguay; Bolivia: Andean Piedmont of Santa Cruz. (772, 1252, 1578, 1583, 2109, 2293)

D. lehmanniana Henrard, Blumea 1: 107. 1934.

Rare, *cerrado*; flowering in November. Distribution: Colombia, Peru, and Argentina; Bolivia: the Yungas. (1488)

D. mattogrossensis (Pilger) Henrard, Meded. Rijks-Herb. 61: 1. 1930. *Panicum adustum* Nees var. *mattogrossensis* Pilger, Bot. Jahrb. Syst. 30: 131. 1901.

Rare, *cerrado*/forest margin; flowering in *March* and April. Distribution: central Brazil. (1922, 2400)

D. neesiana Henrard, Blumea 1: 99. 1934. *Trichachne velutina* Nees, Agrost. Bras. 90. 1829, non *D. velutina* Forssk. ex P. Beauv., 1812, nec *D. velutina* (DC.) Hitchc., 1927. *Panicum vestitum* Kunth, Révis. Gramin. 1: 39. 1829, non *D. vestita* Figari & DeNotaris, 1854. *Valota vestita* (Kunth) Kuhlman, Commiss. Linhas Telegr. Estratég. Mato Grosso Amazonas 67, Anexo 5, Bot. 11: 40. 1922.

Local populations of this species are composed of functionally dioecious plants: pistillate plants have spikelets with vestigial anthers and nonfunctional pollen, while staminate plants have spikelets lacking gynoecia. Common in ungrazed *cerrado*; palatable (3); flowering is dependent upon fire; $2n$ = about 60. Distribution: Colombia and Brazil. (1140, 1192, 1457, **2189**, 2787; *Thomas 5694* NY, LPB)

D. setigera Roth ex Roemer & Schultes, Syst. Veg. 2: 474. 1817. *Syntherisma digitata*

(Sw.) Hitchc., Contr. U.S. Natl. Herb. 12: 142. 1908 (in part).

Similar to *D. horizontalis* Willd., which has a vestigial lower glume. Rare but probably overlooked, a roadside weed. Distribution: throughout the tropics. (1427)

Echinochloa P. Beauv.

Gould, F. W., M. A. Ali & D. E. Fairbrothers. 1972. A revision of *Echinochloa* in the United States, Amer. Midl. Naturalist 87: 36–59.

KEY TO SPECIES

- 1a. Spikelets about 2 mm long, the lower lemma acute to mucronate; racemes unbranched, the spikelets crowded and regularly 4-rowed *E. colona*
 1b. Spikelets 2.5–3.2 mm long, the lower lemma mucronate to aristate; lower racemes branched, irregularly 4-rowed *E. cruz-pavonis*

E. colona (L.) Link, Hort. Berol. 2: 209. 1833. *Panicum colonum* L., Syst. Nat. 10(2): 870. 1759. *Oplismenus colonus* (L.) H.B.K., Nov. Gen. Sp. 1: 108. 1816.

Occasional, roadside ditches. Distribution: throughout the tropics. (2299B, 2304)

E. cruz-pavonis (H.B.K.) Schultes, Mant. 2: 269. 1824. *Oplismenus cruz-pavonis* H.B.K., Nov. Gen. Sp. 1: 108. 1816. *Panicum sabulicola* Nees, Agrost. Bras. 258. 1829. *E. sabulicola* (Nees) Hitchc., Contr. U.S. Natl. Herb. 17: 257. 1913. *E. crusgalli* var. *cruz-pavonis* (H.B.K.) Hitchc., Contr. U.S. Natl. Herb. 22: 148. 1920.

Occasional, roadside ditches. Distribution: throughout the tropics. (2299, 1718)

Echinolaena Desv.

KEY TO SPECIES

- 1a. Lower glume cuspidate, about 5 mm long, surpassing the spikelet but not foliaceous, glabrous; racemes 3–6, ascending; caespitose perennial with stout culms *E. minarum*
 1b. Lower glume foliaceous, 10–15 mm long, coarsely papillose-hispid (rarely glabrous); raceme 1, reflexed; duration indefinite, the culms delicate, decumbent and rooting at the nodes *E. gracilis*

E. gracilis Swallen, J. Wash. Acad. Sci. 23: 457. 1933.

Rare but inconspicuous and probably overlooked, seasonally inundated savanna; flowering

December to May. Distribution: Central America, Colombia, and Venezuela; Bolivia: the Beni. (2083, 2261, 2415; *Bruderreck* 289 ICS, LPB)

E. minarum (Nees) Pilger, Notizbl. Bot. Gart. Berlin-Dahlem 11: 246. 1931. *Oplismenus minarum* Nees, Agrost. Bras. 268. 1829. *Ichnananthus minarum* (Nees) Doell in Mart., Fl. Bras. 2(2): 294. 1877. *I. lilloi* Hack. ex Stuckert, Ann. Conserv. Jard. Bot. Genève 17: 288. 1914. *I. sandiense* Mez, Bot. Jahrb. Syst. 56(124): 5. 1921. *I. riparia* Swallen, Phytologia 11: 150. 1964.

Rare, scrub thickets on margins of granitic outcrops; flowering in February; $2n = 20$. Distribution: Peru, Brazil, and Argentina; Bolivia: Cochabamba and the Yungas. (1820, **2333**)

Eleusine Gaertn.

E. indica (L.) Gaertn., Fruct. & Sem. 1: 8. 1788. *Cynosurus indicus* L., Sp. Pl. 72. 1753.

Common, weed of roadsides and gardens; flowering throughout the year. Distribution: throughout the tropics. (597, 742)

Elionurus Willd.

Renvoize, S. A. 1978. Studies in *Elionurus* (Gramineae). Kew Bull. 32(3): 665–672.

KEY TO SPECIES

- 1a. Culms slender, at most 1 mm in diameter, unbranched (rarely with a second terminal raceme); cilia of lower glume of sessile spikelet not lashlike, of varying lengths *E. muticus*
 1b. Culms stouter, 2–5 mm in diameter, branched to produce 3–8 terminal and axillary racemes; cilia of lower glume of sessile spikelet lashlike, longer below, gradually reduced towards apex of lower glume.
 2a. Lower glume of sessile spikelet 2 mm wide, the nerves 10–13, distinct *E. rostratus*
 2b. Lower glume of sessile spikelet 1–1.5 mm wide, the nerves 5–7, indistinct.
 3a. Back of lower glume of sessile spikelet glabrous to sparsely pilose; cilia of lower glume of sessile spikelet 0.2 mm long *E. tripsacoides*
 3b. Back of lower glume of sessile spikelet pubescent, cilia of lower glume of sessile spikelet 0.8 mm long *E. ciliaris*

E. ciliaris H.B.K., Nov. Gen. Sp. 1: 193. 1816. *E. tripsacoides* var. *ciliaris* (H.B.K.) Hack. in A. DC., Monogr. Phan. 6: 333. 1889.

Intergrading with *E. tripsacoides* and *E. muticus*. Uncommon, as a weed of roadsides, pastures,

and disturbed *cerrado* near villages; unpalatable (0); flowering July to January, possibly stimulated by fire. Distribution: Mexico to Bolivia. (1408, 1682, 1683, 2118, 2774, 2820)

E. muticus (Spreng.) Kuntze, Révis. Gen. Pl. 3(2): 350. 1898. *Lycurus muticus* Sprengel, Syst. Veg. 4(2): 32. 1827. *Andropogon candidus* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 2: 260. 1832. *A. adustus* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 2: 259. 1832. *E. latiflorus* Nees in Steudel, Syn. Pl. Glumac. 1: 364. 1854. *E. candidus* (Trin.) Hack. in Mart., Fl. Bras. 2(3): 306. 1883. *E. adustus* (Trin.) Ekman, Ark. Bot. 13(10): 5. 1913. *E. viridulus* Hack. in Stuck., Anales Mus. Nac. Hist. Nat. Buenos Aires 13: 414. 1906.

An extremely variable taxon with numerous local races (allopatric species?). The most striking divergence in Chiquitania can be observed in *campo rupestre* populations: on Serranía de San Lorenzo plants have villous racemes and the teeth of the lower glume of the sessile spikelet are 2–3 mm long (similar to *E. candidus* var. *bisetosus* Hack. & Lindman); in contrast, plants of the Serranía de Santiago have moderately pubescent racemes, and the teeth of the lower glume of the sessile spikelet are virtually lacking (*E. adustus*); *cerrado* populations are generally intermediate between these two extremes.

Abundant, the dominant grass in *cerrado* communities, providing more than 70% of the herbaceous cover in badly overgrazed savannas; very unpalatable (0), usually (but not always) with an

odor of citrus. Cattle will only graze this species for a few weeks at the end of the dry season after it has been burned. Common but not abundant in *campo rupestre*, which is usually ungrazed; local name: *paja carona*, *paja bruta*, or *pasto amargo*; flowering is dependent upon fire; $2n = 20$. Distribution: northern South America to Argentina, tropical Africa; Bolivia: Andean Piedmont of Santa Cruz, Beni, and the Yungas. (517, 654, 734, 877, 1105, 1196, 1239, 1276, 1454, 1733, **2187**, 2777, 2785)

E. rostratus Nees, Agrost. Bras. 357. 1829. *Andropogon rostratus* (Nees) Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 2: 261. 1832.

Rare roadside weed. Distribution: Argentina; Bolivia: the Beni. (734, 770)

E. tripsacoides Humb. & Bonpl. ex Willd., Sp. Pl. 4: 941. 1806.

Restricted to the Andean Piedmont and intermontane valleys, in well-drained sandy soils; flowering in August, possibly stimulated by fire. Distribution: Mexico to Bolivia. (1113)

Eragrostis Wolf

Harvey, L. H. 1948. *Eragrostis* in North and Middle America. Ph.D. Dissertation. Univ. of Michigan, Ann Arbor, Michigan. Nicora, E. G. 1940. Nota taxonómica sobre *Eragrostis neesii* y *Eragrostis articulata*. Revista Argent. Agron. 7(4): 257–273.

KEY TO SPECIES

- 1a. Floret(s) 1(2–3), lemma about 1 mm long, the sterile rachilla internode prolonged past the palea; panicle 40 cm long and 20 cm wide; foliage glabrous *E. airoides*
- 1b. Florets 2–many; lemmas, panicles, and foliage various; if only one floret developed, then the lemma greater than 1.5 mm long and the foliage pubescent.
 - 2a. Spikelets disarticulating from the apex towards the base, the glumes persistent, the rachilla internodes and paleas falling.
 - 3a. Panicles spicate to narrowly elliptic, the length 10 times the width; spikelets densely arranged on short, erect, or ascending branches, the lowermost distantly placed; lemmas about 1 mm long.
 - 4a. Paleas long-ciliate on the keels; panicles spicate; plants 5–25 cm tall *E. ciliaris*
 - 4b. Paleas glabrous or minutely scabrous on the keels; panicles narrowly elliptic; plants 30–100 cm tall *E. japonica*
 - 3b. Panicles neither spicate nor narrowly elliptic, pyramidal, or ovate, the length less than 5 times the width; spikelets loosely arranged on the branches; lemmas 2–2.5 mm long.
 - 5a. Spikelets linear, lead-colored, the length about 10 times the width; weedy annuals *E. tenuifolia*
 - 5b. Spikelets elliptic or ovate, purple, tan, or lead-colored, the length about 3 times the width; annuals or perennials.
 - 6a. Spikelets about 2 mm wide, the florets densely imbricate and obscuring the rachilla; annuals *E. solida*
 - 6b. Spikelets 1–1.5 mm wide, the florets loosely imbricate and the rachilla more or less visible; perennials.
 - 7a. Spikelets tan; plants robust, the culms 1–1.5 m tall; panicles elliptic, 30–50 cm long.

- 8a. Panicle branches distinctly verticillate at all nodes; lemmas acute; foliage cauline *E. orthoclada*
- 8b. Panicle branches alternate (subverticillate at the lower nodes); lemmas acuminate; foliage basal *E. macrothyrsa*
- 7b. Spikelets lead-colored, the culms 30–70 cm tall; panicles ovoid to pyramidal, 20–30 cm long.
- 9a. Spikelets (1)2–4-flowered; panicle disarticulating at the base of the peduncle; culms with no nodes visible above the basal foliage *E. polytricha*
- 9b. Spikelets 3–6-flowered; panicle not disarticulating at the base of the peduncle; culms with 1–2 nodes visible above the basal foliage *E. lugens*
- 2b. Spikelets disarticulating from the base towards the apex, the glumes and lemmas deciduous, the rachilla and paleas persistent.
- 10a. Pedicels with a glandular ring (rarely lacking in *E. neesii*); foliage coarsely hirsute with papillose-based hairs; annuals; spikelets tan.
- 11a. Foliage cauline; culms branched at lower and middle nodes, about 60 cm tall; spikelets 2–3 mm wide, the lemmas 2.4 mm long *E. chiquitaniensis*
- 11b. Foliage basal; culms unbranched, 10–20 cm tall; spikelets less than 2 mm wide, the lemmas 1.5 mm long.
- 12a. Leaf blades with glandular pits on the midnerve; panicle open *E. articulata*
- 12b. Leaf blades lacking glandular pits; panicle contracted *E. neesii*
- 10b. Pedicels not glandular-ringed; foliage glabrous or pubescent; annuals or perennials; spikelets purple, tan, or lead-colored.
- 13a. Panicle branches 0.5–2 cm long, reflexed or spreading; foliage pubescent.
- 14a. Leaf blades 2–10 cm long, spikelets tan, ovate-elliptic; annuals *E. neesii* var. *lindmanii*
- 14b. Leaf blades 15–50 cm long, spikelets lead-colored, falcate at maturity; perennial bunch grasses *E. perennis*
- 13b. Panicle branches either longer than 2 cm or ascending; foliage generally glabrous.
- 15a. Lower glume narrowly lanceolate, acuminate, subequalling or surpassing the adjacent floret; annuals.
- 16a. Axils of panicle branches and pedicels densely pilose; lemmas acuminate to cuspidate *E. maypurensis*
- 16b. Axils of panicle branches and pedicels glabrous; lemmas acute *E. rufescens*
- 15b. Lower glume ovate to lanceolate, only half as long as the adjacent floret; annuals or perennials.
- 17a. Spikelets 0.8 mm wide, the florets loosely imbricate and erect; margins of lemmas membranous; annuals *E. pilosa*
- 17b. Spikelets 1.2–2.5 mm wide, the florets closely imbricate and spreading (or ascending); margins of lemmas firm; perennials.
- 18a. Axils of panicle branches glabrous, the branches laxly ascending, 5–15 cm long; spikelets distinctly pedicellate and distantly placed, lead-colored, 1–2 mm wide; lemmas acute to blunt *E. bahiensis*
- 18b. Axils of panicle branches pilose, the branches strictly ascending, 1–5 cm long; spikelets sessile, crowded, tan with purple spots, 2–3 mm wide; lemmas acuminate *E. secundiflora*

E. airoides Nees, Agrost. Bras. 509. 1829. *Aira brasiliensis* Raddi, Agrost. Bras. 36. 1823, non *E. brasiliensis* (Raddi) Nees, 1829. *Sporobolus brasiliensis* (Raddi) Hack. ex Stuck., Anales Mus. Nac. Hist. Nat. Buenos Aires 21: 91. 1911. *Agrosticula brasiliensis* (Raddi) Herter, Revista Sudamer. Bot. 6: 145. 1940.

Uncommon, forming distinct colonies in seasonally humid and shallowly inundated savanna; flowering in January and February. Distribution: northern South America to Argentina and Uruguay. (722, 1564, 1833, 2321)

E. articulata (Schrank) Nees, Agrost. Bras. 502. 1829. *Poa articulata* Schrank, Sylloge Ratisb. 1: 194. 1827. *E. glareosa* Trin., Mém.

Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1: 406. 1831. *E. articulata* var. *glabrescens* Henrard, Meded. Rijks-Herb. 40: 69. 1921. *E. neesii* var. *laxa* Jedwabn., Bot. Arch. 5: 206. 1924. *E. articulata* var. *eglandulosa* Nicora, Revista Argent. Agron. 7: 259, 272, f. 4, 3. 1940.

As treated by Nicora (1940), the *E. articulata* complex is composed of two species with several intergrading varieties, all of which are small caespitose annuals with basal, coarsely hirsute foliage. Some Bolivian specimens are intermediate between the varietal taxa (Table 4). Common, superficial soils over granitic outcrops and lateritic crests; occasional, as a weed along roads and as a pioneer of sand dunes in the Andean Piedmont; flowering

TABLE 4. Morphological variation for selected characters in the *Eragrostis articulata* complex.

	Glandular midnerve ¹	Contracted panicle	Glandular pedicel	Sulcate caryopsis	Basal foliage	Branched culms
<i>E. neesii</i>	—	+	+	—	+	—
var. <i>expansiflora</i>	—	—	+	—	+	—
var. <i>lindmanii</i>	—	+	—	—	+	—
Killeen 1338 ²	—	+/-	—	+	+	—
<i>E. articulata</i>	+	—	+	+	+	—
Killeen 1247 ²	+	—	+	—	+	—
var. <i>eglandulosa</i>	—	+/-	+	+	+	—
<i>E. chiquitaniensis</i>	+	—	+	—	—	+

¹ Refers to the midnerve of the leaf blade.

² Intermediate specimens provisionally placed in the preceding taxon.

August to January? Distribution: Brazil, Paraguay, and Argentina; Bolivia: Cochabamba, Andean Piedmont of Santa Cruz, and the Gran Chaco. (1122, 1247, 1481, 1568)

E. bahiensis Schrader ex Schultes, Mant. 2: 318. 1824. *Poa microstachya* Link, Hort. Berol. 1: 185. 1827. *E. expansa* Link, Hort. Berol. 1: 190. 1827. *E. psammodes* Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1: 400. 1831. *E. firma* Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 4(1): 74. 1838. *E. blepharophylla* Jedwabn., Bot. Arch. 5: 197. 1924. *E. macra* Jedwabn., Bot. Arch. 5: 200. 1924.

A difficult taxon with variable inflorescence morphology and indeterminate spikelets (i.e., the number of florets/spikelet ranges from 5 to 30 depending upon the robustness of the individual plant). Occasional, valley-side *campo* (upslope), seasonally humid savanna, and seasonal ponds; frequently in disturbed habitats; flowering throughout the year; $2n = 60$. Distribution: Peru, Brazil, Paraguay, and Argentina: apparently introduced into the United States; Bolivia: Andean Piedmont of Santa Cruz and the Yungas. (779, 782, 785, 821, 1125, 1235, 1256, 1336, 1579, 1656, 1664, 1809, 2110, **2271**; *Bruderreck* 108 ISC, LPB)

E. chiquitaniensis Killeen, sp. nov. TYPE: Bolivia. Santa Cruz: Estancia San Ignacio, 25 km N of San José de Chiquitos, Prva. Chiquitos, 17°35'S, 60°45'W, 320 m, 1 Feb. 1986, Killeen 1728 (holotype, ISC; isotypes, LPB, F, MO, US, SI, NY, CTE). Figure 3.

E. articulata (Schrank) Nees affinis sed robustis, 60 cm altis, culmis 4-6-nodis, ramificantibus copiose ad nodos medios et inferos; foliis caulinis, laminis 15-25 cm

longis, 4-7 mm latis; paniculis 16-27 cm longis, 4-6 cm latis; spiculis 2-4 mm latis, lemmatibus 2.0-2.5 mm longis notabilis.

Caespitose annuals; culms branched, 60 cm tall, glabrous. Foliage cauline, coarsely hirsute with papillose-based hairs; sheaths longer than the internodes below but shorter than internodes at upper nodes, glandular-pitted on the abaxial midrib; ligules ciliate, 1 mm long; blades cordate based, flat, lax, 15-25 cm long, 4-7 mm wide, broadest at the base, the apex long acuminate. Inflorescence an open, elliptic panicle, 16-27 cm long and 4-6 cm wide; branches alternate to subverticillate at the lower nodes, ascending; axils of branches glandular, bearded with stiffly spreading hairs; axis, branches, and pedicels scabrous; pedicels 2-10 mm long, ascending, with a glandular ring 1-2 mm below the insertion of the spikelet. Spikelets pyramidal, 4-12-flowered, the lower bracts spreading, the upper ascending, 4-8 mm long, 2-4 mm wide, glabrous; disarticulation from the base of the spikelet towards the apex, the glumes and lemmas falling, the rachilla and paleas persistent; lower glume ovate, acute, 1.4-1.8 mm long, keeled, the lateral nerves indistinct; upper glume similar, 1.6-2.2 mm long, covering 1/2 of the adjacent lemma; lemmas ovate, acute, keeled at the apex, rounded at the base, the lateral nerves indistinct but visible, 2.4 mm long, 0.4 mm wide when folded; palea 1.6 mm long, minutely ciliate on the keels; caryopsis 0.6 × 0.6 mm, truncate, not sulcate.

This species is closely related to *E. articulata* but differs by its more robust habit, branched culm, cauline foliage, and larger spikelets. Locally common in an open deciduous savanna woodland with a canopy 10-15 m tall and about 60% grass cover. The land north of San José de Chiquitos has relatively fertile, alluvial soils and is rapidly being converted to mechanized agriculture; if narrowly



FIGURE 3. *Eragrostis chiquitaniensis* (Killeen 1728).—A. Habit and inflorescence (bar = 5 cm).—B. Spikelet and pedicel (bar = 1 mm; arrow pointing to glandular ring on pedicel).

restricted to this area, this species will soon be extinct.

E. ciliaris (L.) R. Br. in Tuckey, Narr. Exp. Congo 478. 1818. *Poa ciliaris* L., Syst. Nat., ed. 10. 8: 875. 1759. *Macrolepharus contractus* Philippi, Linnaea 19: 101. 1858.

Common as a weed in streets, yards, and gardens of villages. Distribution: throughout the tropics. (795)

E. japonica (Thunb.) Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 1: 405. 1831. *Poa japonica* Thunb., Fl. Japon. 51. 1784. *P. glomerata* Walter, Fl. Carol. 80. 1788. *E. hapalantha* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 1: 409. 1831. *E. interrupta* (Lam.) Doell in Mart., Fl. Bras. 2(3): 157. 1878. *E. glomerata* (Walter) L. Dewey, Contr. U.S. Natl. Herb. 2: 543. 1894.

Not yet collected in Chiquitania, as a weed in sandy soils along roads on the Andean Piedmont of Santa Cruz. Distribution: throughout the tropics. (2731)

E. lugens Nees, Agrost. Bras. 505. 1829. *E. flaccida* Lindman, Köngl. Svenska Vetensk. Acad. Handl. 34(6): 17. 1900.

Similar to *E. soratensis* Jedwabn., which has 3–6 florets but narrower panicles and no visible nodes above the foliage. Rare in Chiquitania, more common in the Gran Chaco and Andean Piedmont; flowering is stimulated by fire, October to January. Distribution: southern United States to Argentina; Bolivia: Tarija and the Andean Piedmont of Santa Cruz. (1237, 1277, 1565, 1573)

E. macrothyrsa Hack., Feddes Repert. Spec. Nov. Regni Veg. 8: 47. 1910.

Rare, a single population 10 km S of Concepción, *cerrado*/forest margin; flowering in March. Distribution: Argentina and Paraguay. (1832)

E. maypurensis (H.B.K.) Steudel, Syn. Pl. Glumac. 1: 276. 1854. *Poa maypurensis* H.B.K., Nov. Gen. Sp. 1: 161. 1816. *P. racemosa* Vahl, Ecolg. Amer. 1: 7. 1796, non Thunb., 1794. *P. vahlii* Roemer & Schultes, Syst. Veg. 2: 563. 1817. *E. vahlii* (Roemer & Schultes) Nees, Agrost. Bras. 499. 1829. *E. acuminata* Doell in Mart., Fl. Bras. 2(3): 153. 1878.

Not yet collected in Chiquitania but common on the Andean Piedmont of Santa Cruz and the Beni. Distribution: Mexico to Brazil.

E. neesii Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 1: 405. 1831. *E. brasiliana* Nees, Agrost. Bras. 510. 1829. *E. villosa* Steudel, Syn. Pl. Glumac. 276. 1854. *E. lindmanii* Hack., Köngl. Svenska Vetensk. Acad. Handl. 34(6): 19. 1900. *E. neesii* var. *lindmanii* (Hack.) Ekman, Ark. Bot. 13(10): 51. 1913.

Specimens without glandular pedicels are usually placed in *E. neesii* var. *lindmanii* (Table 4). Occasional, superficial soils over granitic outcrops and lateritic crests in *cerrado*; flowering October to February. Distribution: Brazil, Paraguay, Uruguay, and Argentina. (pedicels glandular: 592, 805; lacking glands on pedicels: 747, 1338, 1800)

E. orthoclada Hack., Bull. Herb. Boissier II. 4(3): 281. 1904. *E. longipila* Hack. in Stuck., Anales Mus. Nac. Hist. Nat. Buenos Aires 21: 132. 1911.

Scrub forest, San José de Chiquitos; flowering in January. Distribution: Paraguay and Argentina. (1709)

E. perennis Doell in Mart., Fl. Bras. 2(3): 144. 1878.

Locally common in *cerrado* at Santiago de Chiquitos; flowering is dependent upon fire. Distribution: Brazil. (2793)

E. pilosa (L.) P. Beauv., Ess. Agrostogr. 71, 162. 1812. *Poa pilosa* L., Sp. Pl. 68. 1753.

Common, as a weed in streets and gardens of villages. Distribution: throughout the tropics. (1128)

E. polytricha Nees, Agrost. Bras. 507. 1829. *E. lugens* var. *glabrata* Doell in Mart., Fl. Bras. 2(3): 140. 1878. *E. lugens* var. *glabrescens* Doell in Mart., Fl. Bras. 2(3): 141. 1878.

Common and widespread but never abundant, *cerrado*. The panicle disarticulates at the base of the peduncle and forms a tumbleweed at maturity; flowering is dependent upon fire; $2n = 60$. Distribution: Central America to Argentina and Chile; Bolivia: Andean Piedmont of Santa Cruz. (524, 615, 1104, 1195, 1371, 2188, **2241**)

E. rufescens Schrader ex Schultes, Mant. 2: 319. 1824. *E. acicularis* Trin., Mém. Acad. Imp.

Sci. St.-Petersbourg, Sér. 6, Sci. Math. 1: 406. 1831. *E. multipes* S. L. Moore, Trans. Linn. Soc. Bot. II. 4: 511. 1895. *E. polynura* Jedwabn., Bot. Arch. 5: 205. 1924.

Common, as a weed along roads in sandy or clay soils; naturalized in *cerrado* and seasonally humid savannas; flowering December to May. Distribution: Brazil. (620, 633, 780, 913, 997, 1638, 1678, 1879)

E. secundiflora C. Presl, Rel. Haenk. 1: 276. 1830. *E. compacta* Salzm. ex Steudel, Syn. Pl. Glumac. 1: 275. 1854.

Common, as a weed along paths in seasonally humid savannas and valley-side *campos*; occasional, in *cerrado*; flowering October to June. Distribution: Brazil. (613, 1337, 1342, 1358, 1482, 1542, 1665, 2457)

E. solida Nees, Agrost. Bras. 501. 1829. *E. affinis* Salzm. ex Steudel, Syn. Pl. Glumac. 1: 277. 1854.

Occasional, as a weed in *cerrado* and well-drained soils; flowering August to April. Distribution: Brazil and Paraguay. (1127, 1560, 2005; *Bruderreck* 298 ISC, LPB)

E. tenuifolia (A. Rich.) Hochst. ex Steudel, Syn. Pl. Glumac. 1: 268. 1854. *Poa tenuifolia* A. Rich., Tent. Fl. Abyss. 2: 425. 1851.

Common weed along streets and yards of towns. Distribution: throughout the tropics. (598)

Eriochloa H.B.K.

Shaw, R. B. & F. E. Smeens. 1981. Anatomical and morphological characteristics of the *Eriochloa* (Poaceae) of North America. Bot. Gaz. (Crawfordsville) 142: 534–544.

KEY TO SPECIES

- 1a. Upper lemma with a mucro 1 mm long (hidden by the lower lemma and upper glume); panicle with 4–15 racemes; spikelets loosely arranged; rachis pubescent *E. punctata*
 1b. Upper lemma lacking a mucro; panicle of 1–4 racemes; spikelets regularly 2-rowed, secund; rachis densely hispid.
 2a. Spikelets 3–4 mm long, culms 25–50 cm tall *E. distachya*
 2b. Spikelets 5–7 mm long; culms 50–100 cm tall *E. grandiflora*

E. distachya H.B.K., Nov. Gen. Sp. 1: 95, t. 30. 1816. *Helopus brachystachys* Trin., Sp. Gram. 324: 277. 1831.

Common to locally abundant in savanna wetland communities; rarely in *cerrado* and superficial soils of granitic outcrops; palatable (2); flowering January to (March) June; $2n = 18$. Distribution: Central America to Brazil and Paraguay; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (700, 895, 946, 1458, 1859, 1999, **2441**, 2592)

E. grandiflora (Trin.) Benth., J. Linn. Soc. Bot. 19: 39. 1881. *Helopus grandiflora* Trin., Sp. Gram. 3(24): 278. 1831.

Uncommon, *cerrado* and *cerrado/forest* transition; palatable (3); flowering in March and April. Distribution: Brazil and Paraguay. (1844, 1955, 2006)

E. punctata (L.) Desv. in Hamilt., Prodr. Pl. Ind. Occ. 5. 1825. *Milium punctata* L., Amoen. Acad. 5: 392. 1759. *Helopus cognatus* Steudel, Syn. Pl. Glumac. 1: 101. 1854.

Common, a weed of pastures and roadside ditches; locally abundant in some seasonally inundated savannas; flowering throughout the year. Distribution: southern United States to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Beni, and the Yungas. (921, 971, 996, 1187, 1316, 1506, 1714)

Eriochrysis P. Beauv.

Swallen, J. 1966. Notes on grasses. Phytologia 14(2): 88–91.

KEY TO SPECIES

- 1a. Leaf blades velutinous; lower glume long-ciliate, the hairs 1.5–4 mm long, very dark reddish brown, obscuring the spikelets.
 2a. Hairs borne on the upper $\frac{1}{2}$ th of the lower glume and obscuring the tridentate or blunt apex *E. cayanensis*
 2b. Hairs marginal only, not on the upper $\frac{1}{2}$ th of the lower glume, the apex rounded *E. ×concepcionensis*
 1b. Leaf blades glabrous, scabrous, or pubescent near the junction of the sheath and blade, not velutinous; lower glume short-ciliate to subglabrous, the hairs up to 1.5 mm long (callus hairs to 3 mm), light golden-brown to whitish, not obscuring the spikelets.
 3a. Lower glume obovate, rounded at apex *E. laxa*
 3b. Lower glume lanceolate or asymmetrically falcate, acuminate or bidentate at the apex.
 4a. Panicle 6–10(15) cm long; plants 0.3–1 m tall *E. holcooides*
 4b. Panicle 20–30 cm long; plants 1–2 m tall *E. warmingiana*

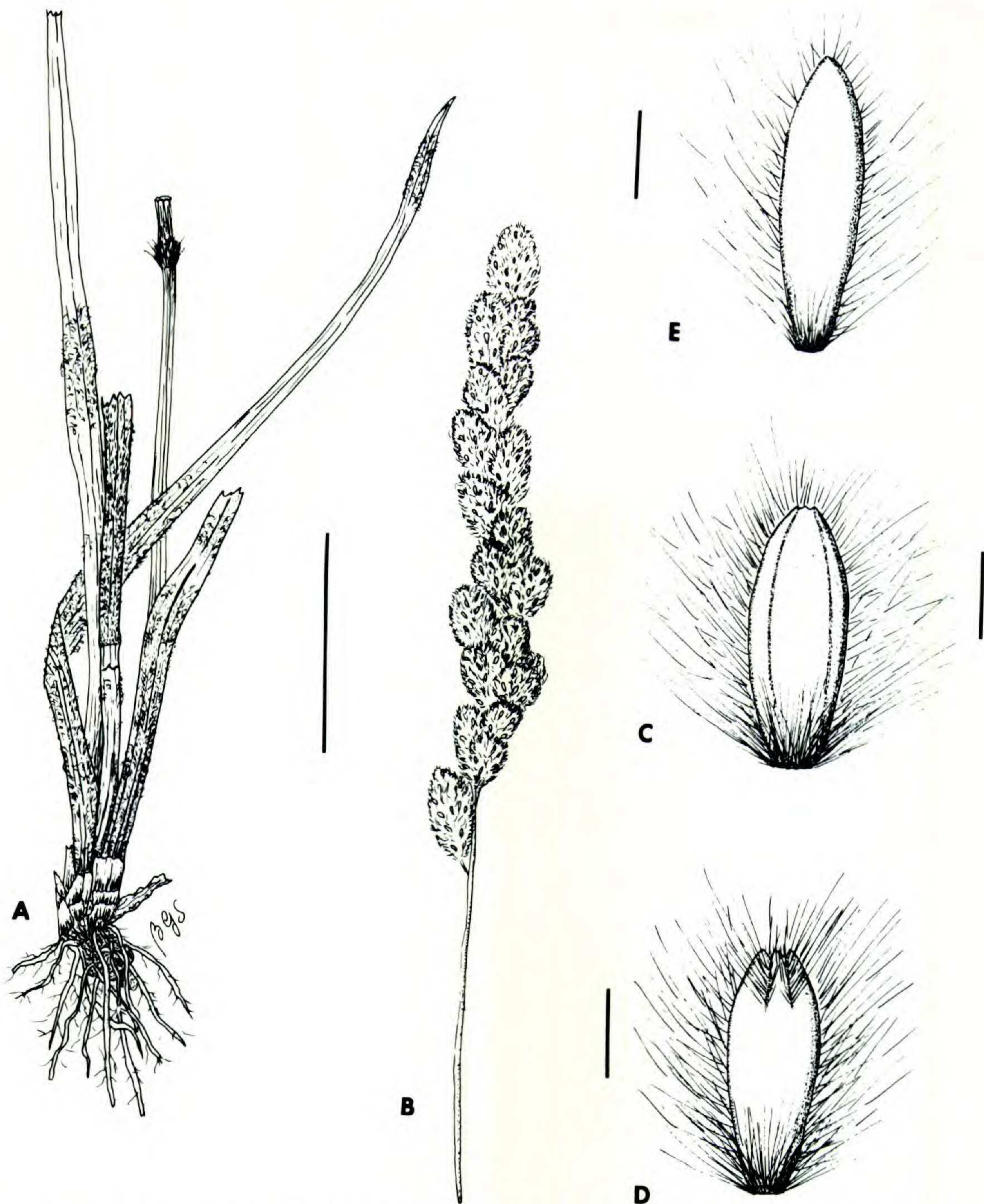


FIGURE 4. Species of *Eriochrysis*. A-C. *E. x conceptionensis* (Killeen 2384).—A. Habit.—B. Inflorescence (A and B: bar = 5 cm).—C. Lower glume of the sessile spikelet.—D. *E. cayanensis* (Killeen 2265). Lower glume of the sessile spikelet.—E. *E. laxa* (Killeen 2264). Lower glume of the sessile spikelet (C, D, and E: bar = 1 mm).

E. cayanensis P. Beauv., Ess. Agrostogr. 8, pl. 4, f. 11. 1812. *Saccharum cayennense* (P. Beauv.) Benth., J. Linn. Soc., Bot. 19: 66. 1881.

Common, valley-side *campo* (midslope) and savanna marsh; occasional, seasonally humid or inundated savanna; rarely in seasonal ponds and laguna margins; unpalatable (0); flowering *November to January* and irregularly throughout the year; $2n = 20$. Distribution: Mexico and the West Indies to Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (1131, 1346, 1438, 1510, 1594, 1860, **2265**)

E. x conceptionensis Killeen, nothosp. nov.
TYPE: Bolivia. Santa Cruz: Estancia Santa

Maria, 10 km S of Concepción, Prva. Ñuflo de Chavez, 16°13'S, 62°00'W, 500 m, 16 Mar. 1987, Killeen 2384 (holotype, ISC; isotypes, LPB, F, MO, US, SI, CTE, NY). Figure 4.

E. laxa Swallen affinis sed pilis nodis culmorum 2 mm longis; velutinis in superficiebus ambabus laminis; marginalibus glumarum ciliatis dense, pilis 1.5–3.0 mm longis, cuprinis, cum pilis callorum spiculas oscurentis notabilis.

Formula: *E. cayanensis* P. Beauv. × *E. laxa* Swallen.

Caespitose perennial; culms unbranched, the nodes densely bearded with hairs about 2 mm long, the internodes glabrous. Foliage mainly basal; sheaths glabrous below, pubescent towards the apex;

ligule a ciliate membrane 0.8 mm long; blades 6–25 cm long and 3–6 mm wide, long-attenuate at the base, reduced at upper nodes, velutinous on both surfaces, flat or involute when stressed. Inflorescence exserted, a lobed, spicate panicle 14 cm long and 1.5 cm wide, the lower branches distantly placed. Spikelets paired, sessile and pedicellate, the two spikelets bisexual and similar, occasionally only pistillate; both subtended by a bearded callus of reddish hairs 2–3 mm long; sessile spikelets 3–3.5 mm long, the pedicellate spikelets 2–2.5 mm long, largest at the base of the branches, gradually reduced in size at upper rachis nodes; disarticulation below the glumes, the sessile spikelet falling with the attached rachis internode and pedicel, the pedicellate spikelet falling separately. Lower glume narrowly elliptic to obovate, dorsally compressed, indurate and nerveless, rounded at the tip, glabrous on back, ciliate on the margins, the stiffly spreading, reddish brown hairs 1.5–3.0 mm long; upper glume laterally compressed, ciliate on the margins; lower lemma hyaline, similar to lower glume in form and length; upper lemma 1.2–1.7 mm long, hyaline, ciliate on the margins; palea minute or lacking; stamens 3, the anthers 1.5 mm long, purple-orange; lodicules membranous, strongly nerved.

A single elliptic population composed of about 300 plants growing in the same habitat with both parental species. The hybrid has the foliage vesture and spikelet pubescence of the local forms of *E. cayanensis*, and the inflorescence morphology and the shape of the lower glume is like *E. laxa*. The three taxa were distinct and no intermediates were observed. Pollen development and seed set in the hybrid was abnormal (nonstained pollen: 82%; seed set: 0%) compared with both parents (nonstained pollen: 8% in *E. laxa* and 8% in *E. cayanensis*; seed set: 34% in *E. laxa* and 37% in *E. cayanensis*). Phenology of the hybrid is unique—the plants bloomed in *March* and *April*, two to three months after the peak flowering season of both parents; locally common, midslope on a valley-side *campo*. (Paratype: *Killeen 1867*)

E. holcoides (Nees) Kuhlman, Comiss. Linhas Teleg. Estratég. Mato Grosso Amazonas 67, Anexo 5, Bot. 11: 89. 1922. *Anatherum holcoides* Nees., Agrost. Bras. 324. 1829. *Andropogon holcoides* (Nees) Kunth, Révis. Gramin. 2: 49. 1829. *Saccharum holcoides* (Nees) Hack. in Mart., Fl. Bras. 2(3): 254. 1883. *S. holcoides* var. *brevipilum* Hack. in A. DC., Monogr. Phan. 126. 1889. *S. hol-*

coides var. *penicillare* Hack. in A. DC., Monogr. Phan. 126. 1889.

A morphologically diverse taxon; plants with burned foliage generally have asymmetrically falcate spikelets with strongly nerved, bidentate, lower glumes (*E. holcoides* s.s.); specimens with unburned foliage have elliptic to lanceolate spikelets with weakly nerved, acuminate lower glumes (*S. holcoides* var. *brevipilum* Hack.). Spikelet hairs range from almost white to dark brown (*S. holcoides* var. *penicillae* Hack.), and glumes range from glabrous to sparsely ciliate. Bolivian material collected to date is like the type of the species. Rare, valley-side *campos* (midslope); locally abundant in a boglike seep in a *campo rupestre* complex (Serranía de Santiago); flowering is dependent upon fire. Distribution: Colombia, Brazil and Paraguay. (1190, 2170, 2792)

E. laxa Swallen, Phytologia 14: 89. 1966.

Occasional, valley-side *campos* with *E. cayanensis* and *Paspalum malmeanum*; unpalatable (0); flowering October (*December*) to April; $2n = 20$. Distribution: central Brazil. (644, 737, 1365, 1437, 1595, 1870, **2264**)

E. warmingeana (Hack.) Kuhlman, Comiss. Linhas Teleg. Estratég. Mato Grosso Amazonas 67, Anexo 5, 11: 29. 1922. *Saccharum warmingiana* Hack. in Mart., Fl. Bras. 2(3): 254. 1883.

Not yet collected in Chiquitania but probably existing in the extensive *pantanal* region of Alto Paraguá (Prva. Velasco). Distribution: Brazil; Bolivia: Andean Piedmont of Santa Cruz and the Beni where it is a zonal dominant of seasonally inundated savannas. (2596; *Steinbach 7032 US*)

Eustachys Desv.

KEY TO SPECIES

- 1a. Lemmas lanceolate, with lashlike cilia about 10 mm long, the keel lacking or weakly developed, glabrous; racemes many *E. distichophylla*
- 1b. Lemmas ovate, with irregular cilia 0.2–0.5 mm long, the keel strongly developed, pubescent (rarely glabrous); racemes 2–many *E. caribaea*

E. caribaea (Spreng.) Herter, Rev. Sudamer. Bot. 6: 147. 1940. *Chloris caribaea* Spreng., Syst. Veg. 1: 295. 1825. *C. bahiensis* Steudel, Syn. Pl. Glumac. 1: 208. 1854. *E. bahiensis* (Steudel) Herter, Fl. Illustr. Uruguay 1: 85, f. 339. 1941. *C. capensis* var. *bahiensis* (Steudel) L. Parodi, Revista Argent. Agron. 20: 26. 1953.

Rare, roadside weed; flowering November to February. Distribution: Brazil, Paraguay, Uruguay, and Argentina. (1407, 1713)

E. distichophylla (Lag.) Nees, Agrost. Bras. 418. 1829. *Chloris distichophylla* Lag., Gen. Sp. Pl. 4. 1816. *C. confertiflora* Trin. in Sprengel, Neue Entd. 2: 74. 1821. *C. fasciculata* Schrader ex Schultes, Mant. 2: 339. 1824. *Paspalum superbum* Sprengel, Syst. Veg. 1: 248. 1825. *C. acuminata* Trin., Sp. Gram. 3: t. 305. 1831.

Occasional, roadside weed; flowering January to June. Distribution: Peru, Brazil, Paraguay, Argentina, and Chile. (695, 977)

Gouinia Fourn.

Swallen, J. R. 1935. The grass genus *Gouinia*. Amer. J. Bot. 22: 31-41.

KEY TO SPECIES

- 1a. Panicle branches lacking spikelets on basal $\frac{1}{3}$ - $\frac{1}{2}$; lemma ciliate on the marginal nerves for $\frac{2}{3}$ - $\frac{3}{4}$ of its length, the awns 2-5 mm long; culms (2)3-5 mm in diameter *G. latifolia*
- 1b. Panicle branches bearing spikelets to the base; lemma ciliate on the marginal nerves for $\frac{1}{3}$ - $\frac{1}{2}$ of its length, the awns 8-15 mm long; culms 1-2 mm in diameter *G. virgata*

G. latifolia (Griseb.) Vasey, Contr. U.S. Natl. Herb. 1: 365. 1895. *Tricuspis latifolia* Griseb., Abh. Königl. Ges. Wiss. Göttingen 19: 259. 1874.

Rare, roadside weed in forest; flowering in May. Distribution: Mexico to Argentina. (948)

G. virgata (C. Presl) Scribn., Bull. U.S.D.A. Div. Agrost. 4: 10. 1897. *Bromus virgatus* C. Presl, Rel. Haenk. 1: 263. 1830.

Common, roadside weed in forest soils; flowering February to June. Distribution: Mexico to Brazil. (833, 969, 1885; Puerto Suarez, Chase 11151 US)

Guadua Kunth

Young, S. M. 1985. The taxonomy and natural history of the *Bambusa guadua* complex (Poaceae: Bambusoideae). M.S. Thesis, Univ. of Florida, Gainesville, Florida. McClure, F. A. 1973. Genera of the bamboos native to the New World (Gramineae; Bambusoideae). Smithson. Contr. Bot. 9: 1-148. 1973.

KEY TO SPECIES

- 1a. Culms 1-5 cm in diameter, 2-15 m tall; sheaths of culm leaves 10-30 cm long.
 - 2a. Culms thin-walled, glabrous when young, green; pseudopetioles 10 mm long; foliage leaf blades about 7 times as long as wide *G. weberbaueri*
 - 2b. Culms solid or thick-walled, the internodes hispid, bearing irritating, whitish hairs when young, becoming glabrous with maturity, yellow-green; pseudopetioles 1-3 mm long; foliage leaf blades 10-15 times as long as wide *G. paniculata*
- 1b. Culms 5-20 cm in diameter, 20-30 m tall; sheaths of culm leaves 30-40 cm long.
 - 3a. Abaxial surface of sheath densely covered with irritating reddish hairs; foliage leaf blades about 30 times as long as wide; rhizomes short, the culms densely packed in clumps 3-8 m in diameter *G. superba*
 - 3b. Abaxial surface of sheath glabrous; foliage leaf blades about 10 times as long as wide; rhizomes elongate, not forming dense, well-defined clumps *G. paraguayana*

G. paniculata Munro, Monogr. Bamb. 85. 1868. *Bambusa paniculata* (Munro) Hack., Oesterr. Bot. Z. 53: 195. 1903. *B. munroi* Hack., Feddes Repert. Spec. Nov. Regni Veg. 7: 374. 1909.

Abundant, forming colonies along *cerrado*/forest margins and dominating tens of thousands of hectares of low forest known locally as "guapasales." Scattered populations began to flower in October 1987 after a severe drought and widespread forest floor fires; only unburned individuals were blooming initially. Populations also flowered in May 1977. Culms provide the matrix for the traditional mud and tile roof of local construction and are used to make pig-proof fences for vegetable gardens; palatable (3); local name: *guapa*. Distribution: Costa Rica to Brazil. (752, 2305, 2329, 2762, 2807; Krapovickas & Schinini 32436 US; Thomas 5659 NY, LPB)

G. paraguayana Doell in Mart., Fl. Bras. 2(3): 179. 1880. *Bambusa paraguayana* (Doell) Bertoni, Anales Ci. Parag. 2(2): 159. 1918.

Rare, Parque Nacional "Noel Kempff Mercado"; forming large diffuse colonies in mesic forest; local name: *taquarembó*. Distribution: Brazil, Paraguay, and northeastern Argentina. (2763, 2764)

G. superba Huber, Bol. Mus. Goeldi 4: 479. 1904. *Bambusa superba* (Huber) McClure, Smithson. Contr. Bot. 9: 68. 1973.

Locally abundant along the Río Quizer near San Ramón and 10 km northwest of San Javier; local name: *taquarembó*. Distribution: Brazil. (2302)

G. weberbaueri Pilger, Feddes Repert. Spec. Nov. Regni Veg. 1: 257. 1830. *Bambusa weberbaueri* (Pilger) McClure, Smithson. Contr. Bot. 9: 68. 1973.

A single known colony in Chiquitania, on the grounds of the municipal swimming pool at San José de Chiquitos; local name: *taquara*. Distribution: Peru; Bolivia: the Yungas. (2818, 2627)

Gymnopogon P. Beauv.

Smith, Jr., J. P. 1971. Taxonomic revision of the genus *Gymnopogon* (Gramineae). Iowa State Univ. J. Sci. 45: 319–385.

KEY TO SPECIES

- 1a. Leaf blades 5–20 mm wide; awns straight, not hygroscopic; spikelets distantly placed on the lower $\frac{2}{3}$ of the spicate branches, crowded towards apex *G. spicatus*
 1b. Leaf blades 3–5 mm wide; awns flexuous, hygroscopic; spikelets uniformly distributed along the whole length of the spicate branches
 *G. fastigiatus*

G. fastigiatus Nees, Agrost. Bras. 430. 1829. *Monochaete fastigiata* (Nees) Doell in Mart., Fl. Bras. 2(3): 79. 1878. *Doellochloa fastigiata* (Nees) Kuntze, Rev. Gen. Pl. 2: 773. 1891. *G. jubiflorus* Hitchc., Contr. U.S. Natl. Herb. 24: 412. 1927. *G. fastigiatus* subsp. *jubiflorus* (Hitchc.) J. P. Smith, Iowa State Univ. J. Sci. 45: 361. 1971.

Common in valley-side *campos* (midslope), occasionally in seasonally inundated savannas and savanna marsh; flowering April to (May) July. Distribution: Colombia, Venezuela, and Brazil; Bolivia: Beni and the Yungas. (1029, 1144, 1350, 2039, 2077, 2588)

G. spicatus (Sprengel) Kuntze, Revis. Gen. Pl. 3(3): 354. 1891. *Polypogon spicatus* Sprengel, Syst. Veg. 1: 243. 1825. *G. biflorus* Pilger, Bot Jahrb. Syst. 30: 139. 1901.

Plants are variable within populations for stature, size of inflorescence, and the number of florets/spikelet. This species is a common constituent of *cerrado*, occupying open spaces between large bunch grasses; unpalatable (0); flowering February to (May) July; $2n = 20$. Distribution: Mexico to Uruguay and Argentina; Bolivia: Andean Piedmont

of Santa Cruz. (890, 924, 1011, 1248, 1567, 1813, 1990, 2017, 2092, **2481**)

Gynerium Willd. ex P. Beauv.

Conert, H. J. 1961. Die Systematik und Anatomie der Arundinoideae. Cramer Verlag, Weinheim.

G. sagittatum (Aubl.) P. Beauv., Ess. Agrostogr. 138, 153, pl. 24, f. 6. 1812. *Saccharum sagittatum* Aublet, Hist. Pl. Guiane 1: 50. 1775. *G. procerum* P. Beauv., Ess. Agrostogr. 164, pl. 24, f. 6. 1812. *G. saccharoides* Humb. & Bonpl., Pl. Aequin. 2: 105, pl. 115. 1813. *Arundo saccharoides* (Humb. & Bonpl.) Poir. in Lam., Encycl. Suppl. 4: 703. 1816. *G. parviflorum* Nees, Agrost. Bras. 463. 1829.

Widespread along the banks of the Río Grande; local name: *caña brava*. Distribution: Central America to Argentina; Bolivia: the Yungas and the Beni.

Hackelochloa Kuntze

H. granularis (L.) Kuntze, Revis. Gen. Pl. 2: 776. 1891. *Cenchrus granularis* L., Mant. Pl. 2: 575. 1771. *Manisuris granularis* (L.) Sw., Prodr. 25. 1788. *Rytilix granularis* (L.) Skeels, U.S.D.A. Bull. Foreign Pl. Intr. 282: 20. 1913. *Mnesithea granularis* (L.) Koning & Sosef, Blumea 31(2): 303. 1986.

Uncommon, on gravel soils of lateritic crests in *cerrado*; flowering November to May. Distribution: throughout the tropics. (634, 892, 1487, 1615)

Hemarthria R. Brown

H. altissima (Poir.) Stapf & C. E. Hubb., Bull. Misc. Inform. 1934: 109. 1934. *Rottboellia altissima* Poir., Voy. Barbarie 2: 105. 1789. *R. fasciculata* Lam., Tabl. Encycl. 1: 204. 1791. *Manisuris altissima* (Poir.) Hitchc., J. Wash. Acad. Sci. 24: 282. 1934. *M. fasciculata* (Lam.) Hitchc., Am. J. Bot. 2: 299. 1915.

Rare, in disturbed soils of seasonally inundated savanna; palatable (3). Distribution: throughout the tropics. (1508, 1553)

Homolepis Chase

Zuloaga, F. O. & T. R. Soderstrom. 1985. Classification of the outlying species of New World *Panicum* (Poaceae: Paniceae). Smithson. Contr. Bot. 59: 1–63.

H. aturensis (H.B.K.) Chase, Proc. Biol. Soc. Wash. 24: 146. 1911. *Panicum aturense* H.B.K., Nov. Gen. Sp. 1: 103. 1816. *P. viridiflorum* Nees, Agrost. Bras. 135. 1829. *P. blepharophorum* C. Presl, Rel. Haenk. 1: 312. 1830.

Rare, streambank in forest; flowering in January. Distribution: Mexico to Brazil; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (1676)

Hymenachne P. Beauv.

KEY TO SPECIES

- 1a. Panicle branches appressed to the axis, forming a spicate panicle; leaf blades 0.5–2(3) cm wide *H. amplexicaulis*
1b. Panicle branches laxly ascending to spreading, the panicle not spicate; leaf blades (1.5)2–4 cm wide *H. donacifolia*

H. amplexicaulis (Rudge) Nees, Agrost. Bras. 276. 1829. *Panicum amplexicaule* Rudge, Pl. Guian. 1: 21, t. 27. 1805. *Agrostis monostachya* Poir., Encycl. Suppl. 1: 256. 1810. *P. perdensum* Steudel, Syn. Pl. Glumac. 1: 65. 1854.

Common, roadside ponds and along banks of streams in full sunlight, especially disturbed cattle crossings; palatable (4); flowering October to April; local name: *cañuela*. Distribution: Mexico to Uruguay and Argentina; Bolivia: the Beni. (790, 1362B, 1691, 1739, 1778, 2380)

H. donacifolia (Raddi) Chase, J. Wash. Acad. Sci. 13: 177. 1923. *Panicum donacifolium* Raddi, Agrost. Bras. 44. 1823. *P. auriculatum* Willd. ex Sprengel, Syst. Veg. 1: 322. 1825. *P. cordatum* Doell in Mart., Fl. Bras. 2(3): 239. 1880. *H. auriculata* (Willd.) Chase, Proc. Biol. Soc. Wash. 21: 5. 1908. *Hymenachne cordata* (Doell) Kulhm., Comiss. Linhas Telegr. Estraté. Mato Grosso Amazonas 67, Anexo 5, Bot. 11: 45. 1922.

Similar to *H. amplexicaulis* in habit, distribution, and phenology, the two species frequently occurring in mixed populations; palatable (4); local name: *cañuela*. Distribution: Costa Rica to Paraguay and northern Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (683, 1362A, 1743, 2450)

Hyparrhenia Andersson in Stapf.

Clayton, W. D. 1969. A revision of the genus *Hyparrhenia*. Royal Botanic Gardens, Kew. Additional Series II. London.

KEY TO SPECIES

- 1a. Spatheate sheaths subtending racemes hirsute; spikelet pairs 2–3 per raceme; lower glume of sessile spikelet with 2 medial longitudinal grooves; racemes reflexed at maturity, rachis hairs white *H. bracteata*
1b. Spatheate sheaths subtending racemes glabrous; spikelet pairs 4–8 per raceme; lower glume of sessile spikelet lacking grooves; racemes ascending, rachis hairs reddish *H. rufa*

H. bracteata (Willd.) Stapf in Prain, Fl. Trop. Africa 9: 360. 1919. *Andropogon bracteatus* Humb. & Bonpl. ex Willd., Sp. Pl. ed. 4. 914. 1806. *Anthistiria foliosa* H.B.K., Nov. Gen. Sp. 1: 191. 1816. *Anthistiria reflexa* H.B.K., Nov. Gen. Sp. 1: 191. 1816. *Anthistiria pilosa* J. S. Presl & C. Presl, Rel. Haenk. 1: 348. 1830. *Andropogon trachypus* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 2: 280. 1832. *Anthistiria andropogonoides* Steudel, Syn. Pl. Glumac. 1: 402. 1855.

Common, seasonally inundated savanna and savanna marsh; somewhat palatable (2), foliage coarse, but less abundant in overgrazed savanna; flowering April to (May) June; $2n =$ about 40. Distribution: Mexico to Brazil and tropical Africa; Bolivia: the Beni. (888, 897, 912, 2020, 2108, 2480, 2595)

H. rufa (Nees) Stapf in Prain, Fl. Trop. Africa 9: 304. 1919. *Trachypogon rufus* Nees, Agrost. Bras. 345: 1829. *Andropogon rufus* (Nees) Kunth, Révis. Gramin. 2(39). 1832.

An important cultivated forage grass that has become naturalized throughout the region in *cerrado* communities and as a weed along roads. When seeded into degraded *cerrado*, this species will replace *Elionurus muticus* as the dominant grass if grazed lightly for two to three years; flowering May to July, a secondary peak of flowering in November; local name: *yaragua*. (516, 1008, 2108A)

Ichnanthus P. Beauv.

Stieber, M. T. 1982. Revision of *Ichnanthus* sect. *Ichnanthus* (Gramineae, Panicoideae). Syst. Bot. 7(1): 85–115. Stieber, M. T. 1987. Revision of *Ichnanthus* sect. *Foveolatus* (Gramineae: Panicoideae). Syst. Bot. 12: 187–216.

KEY TO SPECIES

- 1a. Leaf blades 3–5 mm wide; panicles 5–10 cm long; branches with 3–8 spikelets clustered on

the lower side of the midportion of the branches, and a single long-pedicellate spikelet at apex ...

- *I. procurrens*
 1b. Leaf blades 5–20 mm wide; panicles 10–40 cm long, spikelets irregularly arranged along the branches.
 2a. Paired winglike appendages at base of upper floret present; blades stiffly spreading, usually velutinous; culms stout *I. inconstans*
 2b. Paired appendages lacking (scars only); blades lax, usually glabrous; culms not stout *I. pallens*

I. inconstans (Trin. ex Nees) Doell in Mart., Fl. Bras. 2(2): 287. 1877. *Panicum inconstans* Trin. ex Nees, Agrost. Bras. 132. 1829. *I. velutinus* Ekman, Ark. Bot. 13: 31, p. 2, f. 2. 1913. *I. peruvianus* Mez, Feddes Repert. Spec. Nov. Regni Veg. 15: 129. 1918. *I. polycladus* Mez, Feddes Repert. Spec. Nov. Regni Veg. 15: 129. 1918; see Stieber (1987) for extensive synonymy.

Common, rooting in organic soils of cracks on granitic or sandstone outcrops, rarely in *cerrado* or scrub; palatable (3); flowering January (February) to April and irregularly throughout the year; $2n = 20$. Distribution: Peru, Brazil, Paraguay, and Argentina; Bolivia: the Yungas. (1449, 1731, 1818, 1975, **2331**, 2782B)

I. pallens (Sw.) Munro ex Benth., Fl. Hongk. 414. 1861. *P. pallens* Sw., Prod. 23. 1877. *I. axillare* (Nees) Hitchc. & Chase, Contr. U.S. Natl. Herb. 18: 334. 1917. *I. tipuaniensis* Rogers, Phytologia 26: 59–64. 1973; see Stieber (1982) for extensive synonymy.

Occasional, forming colonies in humid soils of forest and as a weed following shifting agriculture; palatable (4); flowering November to May. Distribution: throughout the tropics. (1376, 2104, 2448)

I. procurrens (Nees ex Trin.) Swallen, Phytologia 11: 149. 1964. *P. procurrens* Nees ex Trin., Gram. Panic. 183. 1826. *Echinolaena procurrens* (Nees ex Trin.) Kunth, Révis. Gramin. 1: 54. 1829.

Common, valley-side *campo* (upslope to downslope), seasonally humid to inundated savanna and savanna marsh, rarely in *cerrado*; unpalatable (0); flowering September (January) to July; $2n = 20$. Distribution: Venezuela, Brazil, Paraguay, and Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (591, 612, 631, 712, 776, 1424, 1642, **2285**, 2590; *Thomas* 5652, 5671 NY, LPB)

Imperata Cyrillo

Gabel, M. L. 1982. A systematic study of the genus *Imperata* (Gramineae: Andropogoneae). Ph.D. Dissertation. Iowa State Univ., Ames, Iowa.

KEY TO SPECIES

- 1a. Inflorescence 7–12 cm long; base of blades as wide as the apex of the sheath, not narrowed to a thickened, indurate midrib *I. brasiliensis*
 1b. Inflorescence 15–30 cm long; base of blades narrower than the apex of the sheath, reduced to a thickened, indurate midrib.
 2a. Lower panicle branches 3–10 cm long; the narrowed base of the blade 5–10 cm long *I. contracta*
 2b. Lower panicle branches 1–2 cm long; the narrowed base of the blade about 1 cm long *I. tenuis*

I. brasiliensis Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 2: 331. 1832. *Saccharum sape* St. Hil., Voy. Distr. Diam. 1: 386. 1833. *I. brasiliensis* var. *mexicana* Rupr., Mém. Acad. Roy. Sci. Bruxelles Bel. 9: 245. 1842. *I. sape* (St. Hil.) Anderss., Ofvers. Förh. Köngl. Svenska Vetensk.-Akad. 12: 160. 1855. *I. arundinacea* var. *americana* Anderss., Ofvers. Förh. Köngl. Svenska Vetensk.-Akad. 12: 160. 1855. *I. caudata* Chapman, Fl. South. U.S., 2nd edition. 1883.

Abundant, forming colonies in densely wooded *cerrado* and on *cerrado*/forest margins, occasionally in *campo cerrado*; a common weed of pastures and roadsides, becoming a serious pest in banana and coffee plantations. Unpalatable (0); flowering is dependent upon fire; $2n = 20$; local name: *sujo*. Distribution: southern United States to Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (1171, **2192**, 2217)

I. contracta (H.B.K.) Hitchc., Ann. Rep. Missouri Bot. Garden 4: 146. 1893. *Saccharum contractum* H.B.K., Nov. Gen. Sp. 1: 182. 1816. *S. dubium* H.B.K., Nov. Gen. Sp. 1: 183. 1816. *S. caudata* G. Meyer, Prim. Fl. Esseq. 68. 1818. *I. caudata* (G. Meyer) Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 2: 331. 1832. *Anatherum berterianum* Sprengel ex Schultes, Mant. 2: 443. 1824. *I. exaltata* var. *caudata* Hack. in DC., Monogr. Phan. 6: 99. 1889. *I. longifolium* Pilger, Bot. Jahrb. Syst. 30: 136. 1901.

Not yet collected in Chiquitania but a zonal dominant of shallowly inundated savannas in the

Beni; probably unpalatable; flowering in July. Distribution: Mexico to Argentina. (2607)

I. tenuis Hack. in A. DC., Monogr. Phan. 6: 689. 1889. *I. exaltata* var. *angustifolius* Hack. in A. DC., Monogr. Phan. 6: 99. 1889.

Common, valley-side *campo* (midslope to downslope), seasonally humid and inundated savanna and savanna marsh; unpalatable (0); flowering December to (February) June. Distribution: central Brazil and northeastern Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (655, 719, 768, 818, 961, 1129, 1580, 1808, 1872, 2117, 2482, 2605)

Lasiacis (Griseb.) Hitchc.

Davidse, G. 1978. A systematic study of the genus *Lasiacis* (Gramineae: Paniceae). Ann. Missouri Bot. Gard. 65: 1133-1254.

KEY TO SPECIES

- 1a. Panicle branches reflexed; sheaths glabrous *L. ligulata*
1b. Panicle branches ascending or spreading, sheaths papillose-hispid *L. sorghoidea*

L. sorghoidea (Desv.) Hitchc., Contr. U.S. Natl. Herb. 18: 338. 1917. *Panicum lanatum* Sw., Prodr. 24. 1788, non Rottb., 1778. *P. sorghoidea* Desv. in Ham., Prodr. Pl. Ind. Occ. 10. 1825. *L. guaraniticum* (Speg.) L. Parodi, Notas Mus. La Plata, Bot. 8: 95. 1943; an extensive synonymy is given in Davidse (1978).

Common, seasonal forest and forest/savanna margins, forming robust colonies along new roads in forest; very palatable (4), an important source of forage in the dry season when most savanna grasses are senescent; flowering January to July; $2n = 36$; local name: *taquarilla*. Distribution: Mexico to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Cochabamba, and the Yungas. (553, 675, 883, 906, 1888, 2014, 2099, 2332)

L. ligulata Hitchc. & Chase, Contr. U.S. Natl. Herb. 18: 337. 1917.

Occasional, forest openings and margins. Distribution: West Indies, northern South America and Brazil; Bolivia: the Yungas. (965, 1000)

Leersia Sw.

Pyrah, G. L. 1969. Taxonomic and distributional studies in *Leersia* (Gramineae). Iowa State J. Sci. 44: 215-270.

L. hexandra Sw., Prodr. 21. 1788. *L. mexicana* H.B.K., Nov. Gen. Sp. 1: 195. 1816. *L. contracta* Nees, Agrost. Bras. 516. 1829. *L. glaberrima* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 5: 172. 1840. *Oryza hexandra* (Sw.) Doell in Mart., Fl. Bras. 2(2): 10. 1877.

Common, forming colonies in shallow lakes, seasonal ponds, and seasonally inundated savannas; very palatable (4), savanna wetlands with a high proportion of this species are prized by ranchers; flowering in March, April, and irregularly throughout the year; populations are largely infertile (seed set <5%); $2n = 48$; local name: *arrocilla*. Distribution: throughout the tropics. (701, 762, 815, 943, 1635, 1777, 2023, 2416)

Leptochloa P. Beauv.

KEY TO SPECIES

- 1a. Lemma papillose, strongly laterally compressed, glabrous or sparsely pilose on back, the margins pilose on upper half, awned or awnless; glumes lanceolate; spikes distinctly 2-ranked *L. virgata*
1b. Lemma not papillose, dorsally compressed, glabrous on back, the margins pilose on lower 1/3, mucronate, acute, or irregularly lobed; glumes ovate or oblong; spikes obscurely 2-ranked or secund.
2a. Apex of lemma irregularly toothed or lobed, the midnerve forming a mucro; spikelets obscurely 2-ranked; racemes 10-20 per panicle *L. uninervia*
2b. Apex of lemma entire, acute or mucronate but not irregularly toothed or lobed; spikelets distinctly secund; racemes 20-40 per panicle *L. scabra*

L. uninervia (C. Presl) Hitchc. & Chase, Contr. U.S. Natl. Herb. 18: 383. 1917. *Megastachya uninervia* C. Presl, Rel. Haenk. 1: 283. 1830. *Diplachne uninervia* (C. Presl) Parodi, Univ. Nac. Buenos Aires Revista Centr. Estud. 18: 147. 1925. *D. tarapacana* Phil., Anales Mus. Nac. Chile Bot. 8: 88. 1891. *D. carinata* Hack., Bol. Acad. Ci. (Córdoba) 16: 253. 1900.

An extremely variable taxon similar to and possibly not distinct from *L. fascicularis* (Lam.) A. Gray. Occasional, as a weed in seasonal ponds and roadside ditches. Distribution: United States to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Beni, and Cochabamba. (825, 1712)

L. scabra Nees, Agrost. Bras. 435. 1829.

Occasional, roadside ditches in standing water; flowering November to February. Distribution: southern United States to Brazil. (1425, 2300)

L. virgata (L.) P. Beauv., Ess. Agrostogr. 71, 166. 1812. *Cynosurus virgatus* L., Syst. Nat. ed. 10. 2: 876. 1759. *Chloris digitaria* H.B.K., Nov. Gen. Sp. 1: 168. 1816. *L. digitaria* (H.B.K.) Nees, Agrost. Bras. 433. 1829. *L. gracilis* (H.B.K.) Nees, Syll. Pl. Ratisb. 1: 4. 1824. *L. domingensis* (Jacq.) Trin., Fund. Agrost. 133. 1820. *L. barbata* Desv., Opusc. Sci. Phys. Nat. 104. 1831. *L. mutica* Steudel, Syn. Pl. Glumac. 1: 208. 1854. *L. villosa* Ekman, Ark. Bot. 10(7): 31, p. 3, 6. 1911.

Common, roadside weed in forest soils; flowering throughout the year. Distribution: southern United States to northern Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Yungas. (602, 607, 639, 827, 828, 840, 973, 1261, 1312, 1567A, 1681, 1708, 2298)

Leptocoryphium Nees

L. lanatum (H.B.K.) Nees, Agrost. Bras. 84. 1829. *Paspalum lanatum* H.B.K., Nov. Gen. Sp. 1: 94, t. 29. 1816. *L. molle* Nees, Agrost. Bras. 85. 1829. *Anthaenantia lanata* (H.B.K.) Benth., J. Linn. Soc. Bot. 19: 39. 1881. *Milium juncoides* Speg., An. Soc. Cient. Argent. 16: 105. 1883.

Occasional in *cerrado*, zonally abundant in sandy soils in valley-side *campos* (upslope); flowering is dependent upon fire; $2n = 20$. Distribution: Central America to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Beni, and the Yungas. (781, 1111, 1163, 1368, 1430, 1455, 1660, **2190**, 2768, 2784; *Thomas 5630* NY, LPB)

Loudetia Hochst. ex A. Braun

L. flammida (Trin.) C. E. Hubb., Bull. Misc. Inform. 1936: 361. 1936. *Arundinella flammida* Trin., Sp. Gram. 3: 267. 1831. *Trichopteryx flammida* (Trin.) Benth., J. Linn. Soc., Bot. 19: 59. 1882.

Common, in savanna marsh, seasonally humid, and seasonally inundated savanna; characteristic of valley-side *campos* where it displays a bimodal distribution at the top and bottom of the soil-moisture gradient (but absent midslope); moderately palatable (2); flowering January (*February*) to May; $2n = 20$. Distribution: Brazil and Paraguay; Bolivia: Andean Piedmont of Santa Cruz and the Yungas. (718, 757, 905, 1747, 1861, **2324**)

Loudetiopsis Conert

L. chrysothrix (Nees) Conert, Bot. Jahrb. Syst. 77: 285. 1957. *Tristachya chrysothrix* Nees, Agrost. Bras. 460. 1829.

Eiten (1972) reported this species to be characteristic of *cerrado* communities in central Brazil, and it is common in the dry savannas of the Andean foothills near Samaipata, Santa Cruz (1,500 m). However, it is rare in Chiquitania and restricted to seasonally humid savannas with sandy soils; flowering in January and February. Distribution: Brazil and Paraguay. (791, 1666, 1738, 1834, 2488)

Luziola Juss. ex Gmel.

Swallen, J. R. 1965. The grass genus *Luziola*. Ann. Missouri Bot. Gard. 52: 472–475.

KEY TO SPECIES

- 1a. Achene striate; pistillate glumes pleated when immature; pistillate panicle with racemose branches, the pedicels appressed to ascending *L. bahiensis*
1b. Achene smooth; pistillate glumes not pleated; pistillate panicle open, freely branched, the pedicel spreading *L. peruvianum*

L. bahiensis (Steudel) Hitchc., Contr. U.S. Natl. Herb. 12: 234. 1909. *Caryochloa bahiensis* Steudel, Syn. Pl. Glumac. 5. 1854. *L. longivalvula* Doell in Mart., Fl. Bras. 2(2): 17. 1871. *L. striata* Bal. & Poit., Bull. Soc. Hist. Nat. Toulouse 12: 231, t. 4, f. 2. 1878. *L. pusilla* S. Moore, Trans. Linn. Soc. Bot. II. 4: 507, t. 37, f. 1–8. 1895. *L. contracta* Hack., Oesterr. Bot. Z. 52: 8. 1902.

Common, in savanna marsh growing underneath the robust dominant *Saccharum trinitii*; flowering November (*December*) to July, possibly stimulated by fire. Distribution: southern United States to Argentina. (622, 1026, 1422, 1647, 1780, 2250)

L. peruvianum Juss. ex Gmel., Syst. Nat. 2: 637. 1791. *L. mexicana* H.B.K., Nov. Gen. Sp. 1: 199. 1816. *Milium natans* Spreng., Syst. Veg. 1: 250. 1825. *L. brasiliana* Moric., Pl. Nouv. Amér. 94, t. 60, 1840. *L. leiocarpa* Lindman, Königl. Svenska Vetensk. Akad. Handl. 34(6): 12. 1900. *L. doelliana* Prodoehl, Bot. Arch. 1: 240. 1922.

Common, in seasonal ponds and occasionally in seasonally inundated savanna; palatable (4); flowering October to (*January*) May. Distribution: southern United States to Argentina; Bolivia: Tarija, Andean Piedmont of Santa Cruz, and the Beni. (850, 1244, 1648, 2085, 2283, 2288)

Melinis P. Beauv.

M. minutiflora P. Beauv., Ess. Agrostogr. 54. 1812. *Panicum melinis* var. *inerme* Doell in Mart., Fl. Bras. 2(2): 242. 1877.

Although occurring as a roadside weed in humid montane regions of Bolivia, in Chiquitania it is a naturalized species characteristic of bromeliad thickets on granitic outcrops; its highly aromatic and glandular foliage makes it very palatable to cattle (4); flowering in *May*; local name: *capim ceroso*. Distribution: throughout the tropics. (933, 2102)

Mesosetum Steudel

Filgueiras, T. de S. 1986. O gênero *Mesosetum* Steudel (Gramineae: Paniceae). Thesis. Universidade Estadual de Campinas, S.P., Brasil. Swallen, J. R. 1937. The grass genus *Mesosetum*. *Brittonia* 2: 363–392.

M. cayennense Steudel, Syn. Pl. Glumac. 118. 1854.

Occasional, superficial soils on granitic outcrops, rarely in gravel soils of *cerrado* (*campo limpo*) or *campo rupestre*; flowering April to September. Distribution: West Indies to Brazil. (908, 1217, 1491, 1981)

Microchloa R. Brown

M. indica (L.f.) P. Beauv., Ess. Agrostogr. 115, t. 20, f. 8. 1812. *Nardus indica* L. f., Suppl. Pl. 105. 1781.

Common, superficial soils over granitic outcrops; rarely on lateritic outcrops in *cerrado*; flowering November to May. Distribution: throughout the tropics; Bolivia: Cochabamba and the Yungas. (799, 1443, 1484, 1547, 1782, 1826, 2091)

Olyra L.

Zuloaga, F. O. & T. R. Soderstrom. 1989. A revision of the genus *Olyra* and the new segregate genus *Parodiolyra* (Poaceae: Bambusoideae: Olyreae). *Smithson. Contr. Bot.* 69: 1–79.

KEY TO SPECIES

- 1a. Pistillate floret pubescent; lower glume long-aristate; lower panicle branches lacking pistillate spikelets *O. ciliatifolia*
- 1b. Pistillate floret glabrous; lower glume short-aristate to acuminate; all panicle branches with pistillate spikelets.
 - 2a. Panicle more or less branched, the branches alternate; pistillate spikelets 1–2 per inflorescence branch, the florets ovate and smooth *O. latifolia*
 - 2b. Panicle of 4–8 verticillate racemes inserted at 1–2 nodes; pistillate spikelets and florets various.
 - 3a. Pistillate spikelets (2)3–4 per raceme,

- the florets narrowly elliptic and distinctly pitted *O. fasciculata*
- 3b. Pistillate spikelets 1–2 per raceme, the florets ovate and smooth *O. caudata*

O. caudata Trin., *Linnaea* 10: 292. 1836. *O. dimidiata* Hochstetter ex Steudel, Syn. Pl. Glum. 1: 36. 1853. *O. pittieri* Hack., *Oesterr. Bot. Z.* 51: 461. 1901.

Rare, forest at Parque Nacional “Noel Kempff Mercado.” (*Thomas* 5734 NY)

O. ciliatifolia Raddi, *Agrost. Bras.* 19. 1823. *O. cuneatifolia* Desv., *Opusc. Sci. Phys. Nat.* 106. 1831.

Occasional, *cerrado*/forest margins and transitional scrub; palatable (2); flowering December to April; $2n = 44$; local name: *taquarilla*. Distribution: northern South America to Brazil and Paraguay; Bolivia: the Beni. (649, 728, 869, 1614, 1889, 1920, **2386**)

O. fasciculata Trin., *Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat.* 3: 113. 1835. *O. heliconia* Lindman, *Köngl. Svenska Vetensk. Acad. Handl.* 34(6): 11. 1900.

Uncommon, in deep shade of seasonal forest, rarely as a weed along roads in forest soils; flowering October to December; local name: *taquarilla*. Distribution: Peru and Brazil; Bolivia: Andean Piedmont of Santa Cruz and the Yungas. (671, 1377, 2385, 2828)

O. latifolia L., *Syst. Nat. ed. 10. 2:* 1261. 1759. *O. arundinacea* H.B.K., *Nov. Gen. Sp.* 1: 197. 1816. *O. cordifolia* H.B.K., *Nov. Gen. Sp.* 1: 198. 1816. *O. pubescens* Raddi, *Agrost. Bras.* 18. 1823. *O. scabra* Nees, *Agrost. Bras.* 306. 1829. *O. brasiliensis* Desv., *Opusc.* 106. 1831. *O. media* Desv., *Opusc.* 106. 1831.

Occasional, seasonal forest and forest openings, locally abundant in gallery forest and along streams in seasonal forest; flowering November to July; local name: *taquarilla*. Distribution: Mexico to Argentina; Bolivia: Beni and the Yungas. (554, 677, 931, 1047, 1379, 1496, 1774, 1969, 2013)

Oplismenus P. Beauv.

Scholz, U. 1981. *Monographie der Gattung Oplismenus. Phanerogamarum Monographiae Tomus XII.* J. Cramer, Vaduz. Davey, J. C. & W. D. Clayton. 1978. Some multiple discrim-

inant function studies on *Oplismenus* (Gramineae). Kew Bull. 33(1): 147–157.

KEY TO SPECIES

- 1a. Awn antrorsely scabrous; racemes hispid
..... *O. burmannii*
1b. Awn smooth; racemes not hispid *O. hirtellus*

O. burmannii (Retz.) P. Beauv., Ess. Agrostogr. 54. 1812. *Panicum burmannii* Retz., Observ. Bot. 3: 10. 1783.

Rare, granitic outcrop; flowering in May. Distribution: throughout the tropics. (939)

O. hirtellus (L.) P. Beauv., Ess. Agrostogr. 54. 1812. *Panicum hirtellum* L., Syst. Nat. ed. 10. 870. 1759. *P. setarium* Lam., Tabl. Encycl. 1: 170. 1791. *O. setarius* (Lam.) Roemer & Schultes, Syst. Veg. 2: 481. 1817. *O. brasiliensis* Raddi, Agrost. Bras. 40. 1823. *O. velutinum* (G. Meyer) Schultes, Mant. 2. 271. 1824.

Sometimes treated as two species (*O. setarius*), but the two forms intergrade and share the same habitat. Common in forest, especially where disturbed by cattle; palatable (3); flowering January to (April) July. Distribution: United States to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Chapare, the Yungas, and the Beni. (693, 750, 1030, 1881, 1886, 1967, 2002, 2009, 2030, 2074)

Orthoclada P. Beauv.

O. laxa (L. Rich.) P. Beauv., Ess. Agrostogr. 70, 149, 168. 1812. *Aira laxa* L. Rich., Actes Soc. Hist. Nat. Paris 1: 106. 1792.

Not yet collected in Chiquitanía but found in forest islands in the Beni. Distribution: Mexico to Brazil.

Oryza L.

Tateoka, T. 1962. Taxonomic studies of *Oryza* I. *O. latifolia* complex. Bot. Mag. Tokyo 75(893): 418–427. Tateoka, T. 1962. Taxonomic studies of *Oryza* II. Several species complexes. Bot. Mag. Tokyo 75(894): 455–461. Tateoka, T. 1963. Taxonomic studies of *Oryza* III. Key to species and their enumeration. Bot. Mag. Tokyo 76(899): 165–173.

KEY TO SPECIES

- 1a. Glumelike bracts about as long as the spikelet
..... *O. grandiglumis*

1b. Glumelike bracts less than ¼ the length of the spikelet.

- 2a. Spikelets whitish green at maturity (rarely reddish), 5–6(7) mm long, erect on the pedicels; lemma muticate or aristate, the awns up to 2 cm long *O. latifolia*
2b. Spikelets reddish or tan at maturity, 7–10 mm long, obliquely inserted on pedicels.
3a. Awn 4–10 cm long; spikelets oblong, 9–10 mm long, spikelets deciduous ..
..... *O. rufipogon*
3b. Awn absent or up to 2 cm long; spikelets elliptic to oblong, 7–9 mm long, spikelets persistent *O. sativa*

O. grandiglumis (Doell) Prodoehl, Bot. Arch. 1: 233. 1922. *O. sativa* var. *grandiglumis* Doell in Mart., Fl. Bras. 2(2): 8. 1871. *O. latifolia* var. *grandiglumis* (Doell) A. Chev., Rev. Int. Bot. Appl. Agric. Trop. 12: 1207. 1932.

Occasional, along streams in forest, especially where light intensity is high; flowering throughout the year; $2n = 48$. Distribution: northern South America, Peru, and Brazil. (922, 1052, 1677, 2232)

O. latifolia Desv., J. Bot. 1: 77. 1813. *O. sativa* L. var. *latifolia* (Desv.) Doell in Mart., Fl. Bras. 2(2): 7. 1871. *O. platyphylla* J. A. Schultes & J. H. Schultes, Syst. Veg. 7: 1364. 1830.

Rare, roadside ditches in forest soils. Distribution: Mexico to northern Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (691)

O. rufipogon Griffiths, Ic. Pl. Asiat. 3: 5, pl. 144, f. 2. 1851. *O. glumipatula* Steudel, Syn. Pl. Glumac. 1: 3. 1854. *O. perennis* Moench sensu Hitchcock, Grasses W. Ind. 145. 1936. *O. paraguayensis* Wedd. ex Fourn., Compt. Rend. Cong. Int. Bot. & Hort. Paris 1878: 233. 1880. *O. sativa* var. *paraguayensis* L. Parodi, Physis 11: 244. 1933.

Commonly collected in Amazonia along river banks, where it is a floating aquatic of indefinite duration with caulescent foliage; however, in Chiquitanía it occurs as a caespitose perennial with basal foliage. Common, seasonal ponds of *pantanal* complex, rarely in seasonally inundated savanna and small pools on granitic outcrops; palatable (4); flowering April (May) to August. Distribution: throughout the tropics. (941, 1894, 2086)

O. sativa L., Sp. Pl. 333. 1753.

Cultivated, usually interplanted with maize; a staple of the local diet.

Otachyrium Nees

Sedulsky, T. & T. R. Soderstrom. 1984. Revision of the genus *Otachyrium* (Poaceae: Panicoideae). *Smithson. Contr. Bot.* 57: 1-24.

O. versicolor (Doell) Henrard, *Blumea* 4: 511. 1941. *Panicum truncatum* Nees, *Agrost. Bras.* 215. 1829, non Trin., 1826. *P. versicolor* Doell in Mart., *Fl. Bras.* 2(2): 254. 1877.

Plants variable between populations for spikelet size and morphology. Locally abundant in shallowly inundated or seasonally humid savanna, rarely in low forest scrub (San José de Chiquitos); palatable

(2-3); flowering is stimulated by (but not dependent upon) fire, August to May. Distribution: Colombia, Venezuela, the Guianas, Brazil, and Paraguay; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (864, 1197, 1522, 1623, 1724, 2769)

Panicum L.

Zuloaga, F. O. 1986. Systematics of new world species of *Panicum* (Poaceae: Paniceae). Pp. 287-309 in T. R. Soderstrom, K. W. Hilu, C. S. Campbell & M. E. Barkworth (editors), *Grass Systematics and Evolution*. Smithsonian Institution, Washington, D.C.

KEY TO SPECIES

- 1a. Spikelets 5-7 mm long; panicles open, disarticulating at the base of the peduncle at maturity; the base of the upper florets with paired tufts of thick hairs *P. olyroides*
- 1b. Spikelets 1-3 mm long; panicles open, narrowly elliptic, spicate, or racemose; the base of the upper florets lacking tufts of thick hairs.
 - 2a. Lowermost panicle branches verticillate.
 - 3a. Upper floret rugose, only the lowermost branches verticillate; caespitose perennial *P. maximum*
 - 3b. Upper floret smooth, the panicle branches verticillate at all the nodes; culms decumbent and rooting at the nodes *P. mertensii*
 - 2b. Panicle branches alternate or subopposite, not verticillate, if several inserted at a single node, then borne on one side and of unequal size.
 - 4a. Glumes and lower lemma vesiculate-pubescent; upper lemma minutely rugose.
 - 5a. Primary panicle branches bearing spikelets to the base, bearing 1-3 secondary panicle branches; pedicels spreading to ascending, 1-5 mm long *P. millegrana*
 - 5b. Primary panicle branches lacking spikelets on lower 1/2-1/3, unbranched; pedicels uniformly short, 0.5-2 mm long and appressed to branches *P. sellowii*
 - 4b. Glumes and lower lemma glabrous or puberulent but not vesiculate-pubescent; upper lemma smooth.
 - 6a. Panicles 2 from each of the upper nodes, overlapping, the bases included in the sheath; sheaths usually coarsely hispid; decumbent annuals.
 - 7a. Spikelets about 3 mm long, the glumes and lower lemma acuminate, the floret ovate to elliptic *P. rudgei*
 - 7b. Spikelets about 2 mm long, the glumes and lower lemma acute, the floret elliptic to suborbicular *P. cayennense*
 - 6b. Panicle 1 from each node, axillary inflorescences (if present) on short leafy branches; sheaths variously glabrous to pubescent but not coarsely hispid; annuals or perennials.
 - 8a. Lower glume 1/2-3/4 the length of spikelet, the apex blunt or rounded; foliage cauline and uniformly distributed on the culms; plants stoloniferous or decumbent and rooting at the nodes.
 - 9a. Spikelets 1.8-2.2 mm long.
 - 10a. Leaf blades velutinous (at least abaxially), lax; panicle of 2-5 racemose branches, pyramidal *P. pantrichum*
 - 10b. Leaf blades glabrous, strictly ascending to erect; panicle freely branched, globose *P. schwackeanum*
 - 9b. Spikelets 1.2-1.5 mm long.
 - 11a. Panicles about 7 x 7 cm; leaf blades ≥ 5 cm long *P. cyanescens*
 - 11b. Panicles about 3 x 3 cm; leaf blades 2-4 cm long *P. parviflorum*
 - 8b. Lower glume up to 1/2 the length of the spikelet, the apex acute (somewhat blunt in *P. dichotomiflorum*); foliage basal or cauline; plants caespitose, rhizomatous, or stoloniferous.
 - 12a. Back of lower lemma with paired, glandular pits *P. pulchellum*
 - 12b. Back of lower lemma not glandular-pitted.
 - 13a. Panicles spicate, the spikelets 6-25, borne on short, erect, appressed branches; plants caespitose, sedgelike, bunch grasses.
 - 14a. Spikelets 10-25, 1.5-1.8 mm long; rachilla internode elongate; foliage usually glabrous *P. stenodes*
 - 14b. Spikelets 5-10, 2.2-2.8 mm long; rachilla internode not elongate; foliage usually pubescent *P. caricoides*
 - 13b. Panicles not spicate; spikelets numerous or if few, then the branches spreading; plant habit various 15

- 15a. Spikelets 1–1.5 mm long.
 16a. Lower glume reduced to a membranous, nerveless scale *P. trichanthum*
 16b. Lower glume well developed, 1–5-nerved.
 17a. Lower lemma lacking a palea.
 18a. Lower glume gibbous, loosely clasping the spikelet; panicles narrowly elliptic, the spikelets ovate, ascending; nodes glabrous *P. scabridum*
 18b. Lower glume not gibbous, tightly clasping the spikelet; panicles pyramidal, the branches racemose, the spikelets lanceolate, secund; nodes bearded *P. polygonatum*
 17b. Lower lemma with a well-developed palea.
 19a. Spikelets 1–1.2 mm long; leaf blades ovate; panicles open, diffuse *P. trichoides*
 19b. Spikelets about 1.5 mm long; leaf blades linear to lanceolate; primary panicle branches sparsely branched, racemose.
 20a. Spikelets uniformly distributed on a pilose rachis *P. pilosum*
 20b. Spikelets irregularly distributed on a glabrous rachis.
 21a. Culms stout, about 5 mm in diameter; leaf blades cordate and clasping the culm at base *P. hylaeicum*
 21b. Culms 1–2 mm in diameter; leaf blades not cordate-clasping at the base *P. laxum*
- 15b. Spikelets 2–3 mm long.
 22a. Lower glume $\frac{1}{4}$ – $\frac{1}{3}$ the length of spikelet, 1-nerved, the apex broadly acute to truncate; anthers bright orange when fresh *P. dichotomiflorum*
 22b. Lower glume about $\frac{1}{2}$ the length of the spikelet, acute to acuminate, 3–5-nerved; anthers variously colored, usually yellow or purple.
 23a. Inflorescence a panicle of secund racemes *P. stoloniferum*
 23b. Inflorescence an open or narrowly elliptic panicle.
 24a. Leaf blades lanceolate, acuminate; plants of shaded habitats *P. haenkeanum*
 24b. Leaf blades linear; heliophytes.
 25a. Upper florets dark chestnut brown, rotated 90° in the spikelet; foliage basal.
 26a. Bracts subtending the upper floret 5: 2 glumes, 2 lower lemmas, and a palea *P. quadriglume*
 26b. Bracts subtending the upper floret 4: 2 glumes, 1 lower lemma, and a palea *P. peladoense*
 25b. Upper florets stramineous to dull brown, not rotated 90°; foliage cauline.
 27a. Plants robust, 1.5–2 m tall, rhizomatous perennials; culms brittle; leaf blades deciduous; pedicels ascending *P. tricholaenoides*
 27b. Plants 30–50 cm tall, caespitose or decumbent annuals; culms not brittle; leaves not caducous; pedicels divergent *P. hirticaule*

P. caricoides Nees ex Trin., Gram. Panic. 149. 1826. *P. stenoides* Hubb., Proc. Amer. Acad. Arts. 49: 497. 1913. *P. junciforme* Steudel, Syn. Pl. Glumac. 1: 82. 1854, nomen nudum.

Easily confused with *P. stenodes*, which grows in more humid or seasonally inundated habitats; both species have been observed growing in adjacent savanna patches without evidence of introgression (2824 vs. 2825 and 2263 vs. 2268, 2269). Common, seasonally humid savanna and valley-side *campos* (upslope); flowering September to January, flowering is stimulated by (but not dependent upon) fire. Distribution: Central America, the West Indies to Brazil. (1373, 2263, 2824)

P. cayennense Lam., Tabl. Encycl. 1: 173. 1791. *P. pedunculare* Willd. ex Steudel, Nomencl. Bot. 2(10): 260. 1841.

Rare, *cerrado* and superficial sandy soil over granitic outcrops; flowering November to January.

Distribution: Mexico to Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (797, 1486)

P. cyanescens Nees in Trin., Gram. Panic. 202. 1826. *P. carannense* Mez, Notizbl. Bot. Gart. Berlin-Dahlem 7: 73. 1917.

Uncommon, seasonally humid savannas; flowering January to July. Distribution: northern South America to Argentina; Bolivia: Andean Piedmont of Santa Cruz. (1096, 1658; *Bruderreck* 122 ISC, LPB)

P. dichotomiflorum Michx., Fl. Bor. Amer. 1: 48. 1803. *P. chloroticum* Nees in Trin., Gram. Panic. 236. 1826. *P. proliferum* var. *richardii* Doell in Mart. Fl. Bras. 2(2): 200. 1877. *P. proliferum* var. *xanthochlorum* Hack. ex Bertoni, Anales Ci. Parag., Ser. 2. 150. 1918; see Zuloaga (1986) for extensive synonymy.

Common in seasonal ponds on granitic outcrops and shallow roadside ditches, occasional in season-

ally inundated savanna, and rarely as a weed along roadsides in dry gravel soils; flowering November to February. Distribution: United States to Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (648, 756, 1504, 1626, 1735)

P. haenkeanum C. Presl, Rel. Haenk. 1: 304. 1830. *P. costaricensis* Hack., Oesterr. Bot. Z. 51: 428. 1901.

Central American specimens are much more robust and have larger panicles than specimens collected in Bolivia and Brazil; however, spikelet morphology and the shape of the leaf blade are characteristic. Rare, in diffuse light of *Orbignya* forest; flowering in August. Distribution: Central America and Brazil. (1094)

P. hirticaule C. Presl, Rel. Haenk. 1: 308. 1830. *P. flabellatum* Fourn., Bull. Soc. Bot. France II. 27: 293. 1880, non Steudel, 1854. *P. caatingense* Renv., Kew Bull. 37: 325. 1982.

Rare, as a weed in pastures and roadsides in humid soils near San José de Chiquitos; flowering in February. Distribution: United States to Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (1702, 1711)

P. hylaeicum Mez, Notizbl. Bot. Gart. Berlin-Dahlem 7: 75. 1917. *P. minutiflorum* Doell in Mart., Fl. Bras. 2(2): 253. 1877, non Rasp., 1825. *P. laxum* var. *pubescens* Doell in Mart., Fl. Bras. 2(2): 213. 1877, in part. *P. laxum* var. *amplissimum* Hack., Feddes Repert. Spec. Nov. Regni Veg. 6: 343. 1909. *P. doelli* Mez, Bot. Jahrb. Syst. 56(125): 27. 1934. *P. boliviense* Hack. sensu Smith, Wasshausen & Klein, Fl. Illustr. Catarinense (Gramineas). 671. 1982.

Rare, roadside ditch in forest soils; flowering in November. Distribution: northern South America to Paraguay. (1426)

P. laxum Sw., Podr. 23. 1788. *P. agrostidiforme* Lam., Tabl. Encycl. 1: 172. 1791; see Zuloaga (1987) for extensive synonymy.

Plants are variable within and between populations for stature and inflorescence morphology. This grass is abundantly represented as a constituent of seasonally inundated savannas, seasonal ponds, and as a weed in roadside ditches; it is rarely found in savanna marsh and valley-side *campos*. An important source of forage, especially in abused savanna wetlands, as this species colonizes openings

in the herbaceous canopy caused by cattle trampling; palatable (4); flowering throughout the year but more abundantly during the rainy season. Distribution: Mexico and the West Indies to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Chapare, Beni and the Yungas. (609, 628, 632, 641, 647, 657, 727, 755, 774, 775, 813, 851, 1063, 1124, 1554, 1575, 1625, 1686, 1687, 1716, 1717, 2286, 2294, 2316, 2587)

P. maximum Jacq., Coll. Bot. 1: 76. 1786. *P. jumentorum* Pers., Syn. Pl. 1: 83. 1805. *P. praticola* Salzm. ex Doell in Mart., Fl. Bras. 2(2): 203. 1877.

A productive, high quality, cultivated, forage grass adapted to forest soils. The traditional variety (*hierba guinea*) is a robust plant reaching 2.5 m in height, newly introduced dwarf cultivars (*panico verde*, *panico petrie*, etc.) can be planted in mixed swards with the legume *Neonotonia wightii* (W.&A.) Verdc. and offer improved pasture management capabilities (Patterson, 1984). Most plants flower March to June, but the dwarf cultivars also flower irregularly throughout the year. (1315)

P. mertensii Roth ex Roemer & Schultes, Syst. Veg. 2: 458. 1817. *P. altissimum* G. Meyer, Prim. Fl. Esseq. 63. 1818. *P. elatior* Kunth, Révis. Gramin. 1: 38. 1829, non L., 1781. *P. megiston* Schultes, Mant. 2: 248. 1824. *P. equisetum* Nees ex Doell in Mart., Fl. Bras. 2(2): 206. 1877, as synonym.

Occasional, an emergent aquatic forming colonies in roadside ditches and along disturbed stream-sides under bridges; flowering in February. Distribution: Mexico and the West Indies to Argentina; Bolivia: the Beni. (1745)

P. millegrana Poir. in Lam., Encycl. Suppl. 4: 278. 1816. *P. rugulosum* Trin., Gram. Panic. 195. 1826. *P. lasianthum* Trin., Sp. Gram. 3, pl. 245. 1830. *P. dispersum* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 3: 282. 1835. *P. subglobosum* Hack., Bull. Herb. Boissier, sér. 2, 4(3): 274. 1904.

Similar to and possibly not distinct from *P. selowii*. Common, seasonal forest, forest/savanna margins, and transitional scrub, forming large colonies in forest openings; palatable (4); flowering November to (January, February) June. Distribution: Mexico to Argentina. (835, 966, 1489, 1675, 2320)

P. olyroides H.B.K., Nov. Gen. Sp. 1: 102. 1816. *P. probiscidium* Trin., Gram. Panic. 184. 1826. *P. funkianum* Steudel, Syn. Pl. Glumac. 1: 77. 1854.

Common, *cerrado* and in the well-drained, sandy soils of the Andean Piedmont; somewhat palatable (2), coarse but plants lacking in overgrazed savanna; flowering January (March) to May; the panicle forms a tumbleweed at maturity; $2n = 36$. Distribution: Venezuela to Argentina; Bolivia: Andean Piedmont of Santa Cruz. (868, 1257, 1559, 1646, 1769, 1847, **2398**; *Thomas 5567* NY, LPB)

P. pantrichum Hack., Verh. Zool.-Bot. Ges. Wien 195: 72. 1915. *P. protractum* Mez, Notizbl. Bot. Gart. Berlin-Dahlem 7: 77. 1917. *P. warmingii* Mez, Bot. Jahrb. Syst. 56(125): 1. 1921.

Locally abundant in low forest scrub on Serranía San Lorenzo, spreading upslope into margins of *campo rupestre*; rarely in *Orbignya* forests near Santa Rosa de la Roca; flowering November to April. Distribution: Central America to Argentina; Bolivia: the Yungas. (1391, 1972)

P. parviflorum Lam., Tabl. Encycl. 1: 173. 1791. *P. brasiliense* Sprengel, Syst. Veg. 1: 321. 1825.

Common, in seasonally inundated savanna, seasonal ponds, and lake margins; flowering November to (January) May. Distribution: throughout the tropics; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (735, 801, 1251, 1254, 1523, 1779, 2278)

P. peladoense Henrard, Blumea 4: 504. 1941. *P. bergii* var. *leiophyllum* Hack. & Lindman, Königl. Svenska Vetensk. Acad. Handl. 34(6): 10, pl. 4B. 1900. *P. campestre* Nees, Agrost. Bras. 197. 1829, non Nees in Trin., 1826. *P. cayennense* var. *campestris* (Nees) Pilger, Bot. Jahrb. Syst. 30: 132. 1901.

Rare, disturbed ground; more common on margins of savanna/scrub of the Andean Piedmont of Santa Cruz; flowering October to January. Distribution: Brazil to Argentina. (823, 1236)

P. pilosum Sw., Prodr. Veg. Ind. Occ. 22. 1788. *P. distichum* Lam., Encycl. 4: 731. 1798. *Setaria disticha* (Lam.) H.B.K., Nov. Gen. Sp. 1: 112. 1816. *P. pilisparsum* G. Meyer, Prim. Fl. Esseq. 57. 1818. *P. trichophorum* Schrader ex Schultes, Mant. 2: 247. 1824.

P. densiflorum Willd. ex Spreng., Syst. Veg. 1: 320. 1825. *P. distans* Willd. ex Spreng., Syst. Veg. 1: 305. 1825.

Uncommon, gallery or swamp forest; common as a weed along roads in forest and savanna soils; palatable (5); flowering throughout the year. Distribution: Mexico and the West Indies to Argentina; Bolivia: Beni and the Yungas. (605, 730, 748, 792, 1054, 1515, 1689, 1741, 1880, 1961, 2319)

P. polygonatum Schrader ex Schultes, Mant. 2: 256. 1824. *P. potamium* Trin., Gram. Panic. 239. 1826. *Setaria polygonata* (Schrader) Kunth, Révis. Gramin. 1: 47. 1829. *P. hydrophyllum* Trin. ex Nees, Agrost. Bras. 208. 1829, non Schultes, 1824. *P. pilosum* var. *polygonatum* (Schrader) Doell in Mart., Fl. Bras. 2(2): 211. 1877. *P. ecuadorensis* Mez, Bot. Jahrb. Syst. 56(125): 3. 1921.

Rare, humid forest in deep shade; flowering in October. Distribution: Mexico to Paraguay; Bolivia: Andean Piedmont of Santa Cruz and the Yungas. (1380)

P. pulchellum Raddi, Agrost. Bras. 42. 1823. *Eriochloa pulchellum* (Raddi) Kunth, Révis. Gramin. 1: 30. 1829. *P. bipustulatum* Schlect., Linnaea 26: 135. 1853.

Rare, seasonal forest and forest margins; flowering December to May. Distribution: Brazil; Bolivia: the Yungas. (653, 2073)

P. quadriglume (Doell) Hitchc., Contr. U.S. Natl. Herb. 24(8): 460. 1927. *P. cayennense* var. *quadriglume* Doell in Mart., Fl. Bras. 2(2): 220. 1877. *P. bergii* var. *quadriglume* Henrard, Meded. Rijks-Herb. 40: 52. 1921. *P. eccentricos* Hitchc. & Chase ex Rojas, Revista Jard. Bot. Mus. Hist. Nat. Paraguay 2: 164. 1930, nomen nudum.

Common but never abundant, *cerrado*; somewhat palatable (3); flowering January (March) to May; $2n = 18$. Distribution: Brazil and Paraguay; Bolivia: Andean Piedmont of Santa Cruz and the Yungas. (736, 758, 856, 891, 1563, 1616, 1770, 1828, 1848, **2397**)

P. rudgei Roemer & Schultes, Syst. Veg. 2: 444. 1817. *P. scoparium* Rudge, Pl. Guian. 1: 21, pl. 29, 1805, non Lam., 1798. *P. pilosissima* Roth ex Roemer & Schultes, Syst. Veg. 2: 458. 1817. *P. dasytrichum* Spreng., Syst.

Veg. 1: 317. 1825. *P. rhigiophyllum* Steudel, Syn. Pl. Glumac. 1: 76. 1854. *P. cayennensis* var. *divaricatum* Doell in Mart., Fl. Bras. 2(2): 220. 1877.

Occasional, weed along roads and as a natural constituent in *campo rupestre*/forest scrub margin on Serranía San Lorenzo; coarse and unpalatable (0); flowering November to March. Distribution: Costa Rica to Brazil; Bolivia: the Yungas. (1397, 1962)

P. scabridum Doell in Mart., Fl. Bras. 2(2): 201. 1877.

Rare, seasonally inundated savanna and forest scrub; flowering November to January. Distribution: the Guianas and Brazil; Bolivia: the Beni. (1514, 1688)

P. schwackeanum Mez, Bot. Jahrb. Syst. 56(125): 1. 1921. *P. helobium* Mez ex Ekman, Ark. Bot. 11: 23. 1921. *P. cyanescens* var. *latifolium* Doell in Mart., Fl. Bras. 2(2): 263. 1877.

Occasional, seasonally inundated savanna; flowering January to March; $2n = 60$. Distribution: Brazil, Paraguay, Uruguay, Argentina. (1634, 2413)

P. sellowii Nees, Agrost. Bras. 153. 1829. *P. beyrichii* Kunth, Révis. Gramin. 2: 231, pl. 27. 1830. *P. puberulum* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 3: 277. 1835, non Kunth, 1829. *P. probandum* Steudel, Syn. Pl. Glumac. 1: 76. 1854. *P. rugulosum* var. *condensatum* Hack., Feddes Repert. Spec. Nov. Regni Veg. 6: 343. 1909.

Occasional, forest margin and low forest scrub; palatable (5); flowering January to February. Distribution: Mexico and the West Indies to Argentina; Bolivia: Chapare and the Yungas. (831, 1732, 2105)

P. stenodes Griseb., Fl. Brit. W. Ind. 547. 1864. *P. caricoides* var. *glabriusculum* Doell in Mart. Fl. Bras. 2(2): 239. 1877.

Common, seasonally inundated savanna; coarse but somewhat palatable (2) and less common in overgrazed savannas. Flowering is stimulated by fire but plants also bloom irregularly throughout the year. Distribution: Central America and the West Indies to Brazil; Bolivia: the Beni. (610, 710, 1025, 1199, 2075, 2268, 2269, 2770, 2825)

P. stoloniferum Poir. in Lam., Encycl. Suppl. 4: 274. 1816. *P. frondescens* G. Meyer, Prim. Fl. Esseq. 56. 1818. *P. olyrifolium* Raddi, Agrost. Bras. 43. 1823. *P. ctenodes* Trin., Sp. Gram. 2, pl. 171. 1829.

Common, forming colonies in gallery forests or along streams in seasonal forest; palatable (5); flowering November to May. Distribution: Central America and the West Indies to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Beni, and the Yungas. (606, 682, 1386, 1519, 2029)

P. trichanthum Nees, Agrost. Bras. 210. 1829. *P. guayaquilense* Steudel, Syn. Pl. Glumac. 1: 85. 1854.

Common weedy species of forest openings, pastures, and along roads, from deep shade to full sunlight, in well-drained, seasonally inundated or marshy soils; palatable (4); flowering throughout the year. Distribution: Mexico and the West Indies to Paraguay; Bolivia: Chapare and the Yungas. (899, 1053, 1091, 1259, 1556, 1970, 2773)

P. trichoides Sw., Prodr. Veg. Ind. Occ. 24. 1788. *P. capillaceum* Lam., Tabl. Encycl. 1: 173. 1791.

Common weed in forest openings and along well-shaded roads in forest; palatable (4); flowering November to April. Distribution: throughout the tropics. (552, 604, 836, 1892, 1971)

P. tricholaenoides Steudel, Syn. Pl. Glumac. 1: 68. 1854. *P. junceum* Nees, Agrost. Bras. 159. 1829, non Trin., 1826. *P. bambusoides* Speg. ex Arechav., Anales Mus. Nac. Montevideo 1: 128, pl. 9, 10. 1894, non Desv. ex Ham., 1825. *P. pilgeri* Herter, Herb. Corn. Osten. Com. 1: 2. 1925, non Mez, 1904.

Occasional, seasonally inundated savanna; flowering November to January. Distribution: Colombia to Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Beni where it is a zonal dominant in seasonally inundated savannas (Beck, 1984). (720, 778, 1505)

Pappophorum Schreb.

Pensiero, J. F. 1986. Revisión de las especies Argentinas del género *Pappophorum* (Gramineae, Eragrostoideae, Pappophoreae). Darwiniana 27: 65-87.

KEY TO SPECIES

- 1a. Basal lemma of each spikelet inflated, 2-2.5 mm × 1.8-2.5 mm wide (when viewed later-

- ally), with 19–26 awns, the second lemma bisexual (rarely sterile) *P. krapovickasii*
 1b. Basal lemma of each spikelet thin, 1–1.2 mm × 0.3–1 mm wide, with 11–15 awns, the second lemma sterile *P. pappiferum*

P. krapovickasii Roseng., *Comun. Bot. Mus. Hist. Nat. Montevideo* IV(58): 1–5. 1975.

Rare, as a weed in disturbed places; flowering November to February. Distribution: Argentina and Paraguay. (1520, 1729)

P. pappiferum (Lam.) Kuntze, *Revis. Gen. Pl.* 3(2): 365. 1898. *Saccharum pappiferum* Lam., *Tabl. Encycl.* 1: 155. 1791. *P. alopecuroideum* Vahl., *Symb. Bot. Upsal.* 3: 10. 1794. *P. laguroideum* Schrader ex Schultes, *Mant.* 2: 342. 1824. *P. macrostachyum* Schrader ex Schultes, *Mant.* 2: 342. 1824.

P. elongatum Sprengel, *Syst. Veg.* 4(2): 34. 1827. *P. polystachyum* Kunth, *Révis. Gramin.* 2: 435. 1831. *P. saccharoides* Griseb., *Symb. Fl. Arg.* 301. 1879.

Rare, as a weed along roads near San Ignacio de Velasco; flowering October to January. Distribution: Mexico to Argentina; Bolivia: Cochabamba, Tarija, and the Gran Chaco. (1308, 1684)

Paspalum L.

Chase, A. 1929. The North American species of *Paspalum*. *Contr. U.S. Natl. Herb.* 28(1): 1–310. Chase, A. The South American species of *Paspalum*, unpublished manuscript on file at the Hitchcock-Chase Library, U.S. National Herbarium, Smithsonian Institution, Washington, D.C.

KEY TO SPECIES

- 1a. Spikelets densely pubescent.
 2a. Upper glume glabrous, broadly winged and cordate-based; lower lemma with stiff papillose-based hairs; spikelets 5.5–7 mm long *P. pectinatum*
 2b. Upper glume pubescent, ciliate, or glabrous, neither winged nor cordate-based; lower lemma glabrous or pubescent; spikelets 0.8–5 mm long.
 3a. Racemes 10–20; spikelets softly pilose *P. urvillei*
 3b. Racemes 1–6; spikelets variously pubescent.
 4a. Upper glume with stiff, erect or spreading, submarginal hairs or cilia.
 5a. Rachis foliaceous, 5–9 mm wide; pedicels with a ring of hairs at apex; racemes 1, subtended by a sterile bract inserted at the apex of the peduncle (rarely the bract developed into a second conjugate raceme) *P. stellatum*
 5b. Rachis not foliaceous or only slightly so, less than 3 mm wide; pedicels various; racemes 1–many.
 6a. Spikelets narrowly elliptic, 4–5 mm long; submarginal cilia of the glume well developed on the lower half (2–4 mm long) but lacking or short-ciliate above *P. carinatum*
 6b. Spikelets elliptic to ovate, 2–3.5 mm long; submarginal cilia of the glume well developed on the upper half (2–4 mm long) or along the entire length.
 7a. Racemes 1–5, borne on an elongate axis; spikelets 2–3.5 mm long; upper glume irregularly long-ciliate (1–4 mm) throughout its length, the stouter cilia tuberculate-based, the margins corky *P. polyphyllum*
 7b. Racemes 2, conjugate; spikelets 2 mm long; upper glume long-ciliate towards the apex (1–2 mm), short-ciliate on the lower half (0–0.2 mm), the cilia not tuberculate-based, the margins not corky *P. malmeanum*
 4b. Upper glume uniformly pubescent, lacking stiff submarginal hairs or cilia.
 8a. Raceme solitary; spikelets 1.8–2 mm long, the hairs on upper glume and lower lemma tuberculate-based *P. ekmanianum*
 8b. Racemes 3–6; spikelets 3–5 mm long, the hairs on upper glume and lower lemma not tuberculate-based.
 9a. Leaf blades 8–20 mm wide, flat; spikelets 3.5–5 mm long; lower lemma acute *P. erianthum*
 9b. Leaf blades 2–4 mm wide, involute; spikelets 2.8–3.5 mm long; lower lemma blunt *P. ammodes*
 1b. Spikelets not densely pubescent—either glabrous, puberulent, or minutely ciliate.
 10a. Upper glume (as well as the lower glume) lacking or reduced to a membranous scale, the back of the upper lemma exposed.
 11a. Upper lemma prominently 3–5-nerved *P. malacophyllum*
 11b. Upper lemma nerveless or the nerves indistinct.
 12a. Apex of pedicel bearded; upper glume lacking *P. gardnerianum*
 12b. Apex of pedicel glabrous; upper glume a membranous scale covering ¼ of upper floret *P. inaequalve*

- 10b. Upper glume well developed, equal or subequal to spikelet.
- 13a. Spikelets 1–2 mm long.
- 14a. Upper floret dark chestnut brown section *Plicatula*, go to lead 28b
- 14b. Upper floret stramineous.
- 15a. The margins of the glume ciliate, the spikelets suborbicular, acute *P. conjugatum*
- 15b. The glume glabrous or puberulent but not ciliate, the spikelet orbicular, elliptic, or obovate.
- 16a. Racemes 6–15(20); caespitose perennials.
- 17a. Racemes stiffly ascending, the rachis ciliate, 1–5 cm long; foliage succulent, the blades 2–4 mm wide, stiffly ascending *P. humigenum*
- 17b. Racemes lax, the rachis glabrous, 3–10 cm long; foliage not succulent, the blades 5–15 mm wide, lax *P. paniculatum*
- 16b. Racemes 1–3(4); caespitose annuals or perennials.
- 18a. Upper glume and lower lemma with glandular hairs or globular, glassy papillae; annuals.
- 19a. Spikelets 0.8 mm long; pedicels flattened, erect; racemes 2–3, borne on a short axis *P. parviflorum*
- 19b. Spikelets 1–1.8 mm long; pedicels terete or triquetrous; racemes 1 or 2, if 2 then conjugate (rarely a third below).
- 20a. Spikelets orbicular, the upper glume and lower lemma provided with globular, glassy papillae *P. multicaule*
- 20b. Spikelets obovate to elliptic, the upper glume and lower lemma provided with glandular-tipped hairs *P. clavuliferum*
- 18b. Upper glume and lower lemma glabrous; annuals or perennials.
- 21a. Upper floret rugose; upper glume and lower lemma not covering the sides of the upper floret; spikelets obovate; annual *P. pictum*
- 21b. Upper floret smooth; upper glume and lower lemma covering the sides of the upper floret; spikelets elliptic; perennial *P. pumilum*
- 13b. Spikelets 2–4 mm long.
- 22a. Racemes 2, conjugate or nearly so (rarely a third raceme below).
- 23a. Spikelets mottled with purple (brown in old or alcohol specimens), 2.2–2.5 mm long, broadly elliptic, blunt *P. maculosum*
- 23b. Spikelets not mottled, 2.2–5 mm long, narrowly elliptic to orbicular, acute to blunt.
- 24a. Racemes reflexed at maturity; plants stoloniferous perennials of sandy soils *P. vaginatum*
- 24b. Racemes ascending at maturity; plants caespitose, stoloniferous or rhizomatous perennials.
- 25a. Spikelets narrowly elliptic, 3 times as long as wide; plants caespitose, not a turf grass.
- 26a. Spikelets 1.5–2 mm wide; racemes subconjugate or conjugate, pilose at base *P. lineare*
- 26b. Spikelets 1 mm wide; racemes strictly conjugate, glabrous at base *P. pallens*
- 25b. Spikelets ovate to suborbicular; rhizomatous turf grasses.
- 27a. Spikelets 2.5–2.8 mm long, orbicular, blunt *P. minus*
- 27b. Spikelets 3–4 mm long, broadly elliptic, acute *P. notatum*
- 22b. Racemes 1–many, borne on a short to elongate axis, neither conjugate nor subconjugate.
- 28a. Rachis 1–3 mm wide, flattened or foliaceous; upper florets slightly convex, stramineous, tan, or dark brown.
- 29a. Rachis 2–3 mm wide; plants decumbent and rooting at the nodes.
- 30a. Rachis 3 mm wide; spikelets acuminate; upper floret stramineous; culms prostrate or scandent *P. acuminatum*
- 30b. Rachis 2 mm wide; spikelets blunt; upper floret stramineous, tawny or dark brown, when dark brown then the margins of the upper lemma white; culms erect *P. wrightii*
- 29b. Rachis about 1 mm wide, flattened; plants caespitose perennials.
- 31a. Racemes more than 40; basal sheaths strongly equitant, succulent, and with reticulate venation.
- 32a. Spikelets elliptic; axis of inflorescence (20)30–50 cm long *P. intermedium*
- 32b. Spikelets suborbicular; axis of inflorescence 15–20(25) cm long *P. densum*
- 31b. Racemes 4–15; basal sheaths compressed to rounded but not strongly equitant, lacking reticulate venation.
- 33a. Racemes 1–3 cm long, arcuate, ascending; upper florets stramineous; leaf blades lacking serrated margins *P. lividum*

- 33b. Racemes 5–15 cm long, laxly ascending; upper florets cream-colored to dark brown; leaf blades with serrated (cutting) margins.
- 34a. Spikelets 2.5–3.2 mm long, strongly obovate; upper glume and lower lemma green or brown, not purple spotted, the upper glume pubescent near the apex; upper floret very dark brown *P. virgatum*
- 34b. Spikelets 2.2–2.5 mm long, elliptic to obovate; upper glume and lower lemma purple spotted, glabrous; upper floret cream-colored to dark brown *P. conspersum*
- 28b. Rachis 0.5 mm wide, triquetrous or terete; upper florets strongly plano-convex; dark brown and shiny (sect. *Plicatula*).
- 35a. Spikelets 1.8–3 mm long.
- 36a. Lower lemma indurate, dark brown and shining, similar to the upper floret; spikelets biconvex (i.e., both upper and lower florets plano-convex) *P. lenticulare* f. *intumescens*
- 36b. Lower lemma not indurate, bicolored (the margins light tan and thickened, surrounding a dark brown, papery center); spikelets plano-convex.
- 37a. Spikelets 2–3 mm long; lower lemma plicate, with transverse wrinkles spreading inward from the thickened margins.
- 38a. Spikelets 2–2.5 mm long, elliptic; blades folded, the sheaths compressed; plants of savanna wetlands *P. lenticulare*
- 38b. Spikelets 2.5–3.0 mm long, broadly elliptic to obovate; blades flat, the sheaths somewhat compressed or rounded on the back; plants of well-drained soils *P. plicatulum*
- 37b. Spikelets 1.8–2 mm long; lower lemma not plicate, lacking transverse wrinkles *P. limbatum*
- 35b. Spikelets 3–4 mm long.
- 39a. Upper glume and lower lemma with irregular reticulate wrinkles, generally glaucous between the wrinkles *P. gemniflorum*
- 39b. Upper glume and lower lemma either lacking reticulate wrinkles, or with transverse wrinkles (plicate) on the lower lemma only.
- 40a. Culms stout, about 5 mm in diameter; racemes 10–20; spikelets elliptic *P. atratum*
- 40b. Culms 1–3(5) mm in diameter; racemes 2–6; spikelets obovate or broadly elliptic.
- 41a. Lower lemma bicolored, with transverse wrinkles spreading inward from the thickened margins (plicate); axils of racemes pilose *P. guenoarum*
- 41b. Lower lemma not bicolored, the margins similar to the central area, lacking transverse wrinkles; axils of racemes glabrous or sparsely pilose.
- 42a. Spikelets 3–3.4 mm long, glabrous at base of bracts; lower glume absent; axils of racemes glabrous *P. macedoi*
- 42b. Spikelets 3.7–3.9 mm long, minutely pubescent at the base along the line of the insertion of the glumes and the lower lemma; lower glume present, vestigial or a narrow triangular bract $\frac{1}{4}$ the length of to subequalling the spikelet; axils of racemes sparsely pilose *P. kempffii*

P. acuminatum Raddi, Agrost. Bras. 25. 1823.

Rare, as a floating aquatic in artificial pond. Distribution: United States to Argentina; Bolivia: the Beni. (2325)

P. ammodes Trin., Gram. Panic. 120. 1826. *P. sordidum* Hack., Oesterr. Bot. Z. 51: 197. 1901.

Locally common in *cerrado* and *campo rupestre* near Santiago de Chiquitos; flowering is dependent on fire. Distribution: northern South America to Brazil and Paraguay. (2781, 2786)

P. carinatum Humb. & Bonpl. ex Flüge, Gram. Monogr., *Paspalum* 65. 1810. *P. kappleri* Hochst. in Steudel, Syn. Pl. Glumac. 1: 21. 1854. *P. stellatum* sensu Trin., Sp. Gram. 1: 119. 1828.

Occasional, seasonally humid savannas with sandy soils near Santa Rosa de la Roca (Prva. Velasco); flowering October to January, apparently stimulated by fire. Distribution: northern South America to Brazil. (1436, 1659, 2823)

P. clavuliferum Wright, Anales Acad. Cienc. Habana 8: 203. 1871. *P. falcula* Doell in

Mart., Fl. Bras. 2(2): 61. 1877. *P. horticola* Salzm. ex Doell in Mart., Fl. Bras. 2(2): 61. 1877, as synonym. *P. pittieri* Hack. ex Beal, Gr. of N. Amer. 2: 88. 1896.

Uncommon, in seasonal pools or humid sandy soils on granitic outcrops; flowering November to January. Distribution: Mexico and the West Indies to Brazil. (811, 1534)

P. conjugatum Bergius, Act. Helv. Phys. Math. 7: 129, t. 8. 1762. *P. renggeri* Steudel, Syn. Pl. Glumac. 17. 1854.

Common, as a weed in pastures and along paths and roadsides in forest; palatable (4); flowering December to (January) April. Distribution: throughout the tropics. (650, 673, 749, 814, 1679, 1752)

P. conspersum Schrader ex Schultes, Mant. 2: 174. 1824.

Common, seasonally inundated savanna; palatable (2); flowering October to (January) February; $2n =$ about 40, abnormal meiosis indicates the species is probably apomictic. Distribution: Mexico to Argentina; Bolivia: the Yungas. (845, 1632, 2317)

P. densum Poir. in Lam., Encycl. 5: 32. 1804. *P. paniceum* Smith in Rees, Cycl. 26: 14. 1813.

Rare, roadside ditch in seasonally inundated soils; flowering in January. Distribution: Central America and the West Indies to Brazil; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (2301)

P. ekmanianum Henrard, Meded. Rijks-Herb. 40: 49. 1921.

This species is similar to *P. verrucosum* Henrard of Paraguay and southern Brazil, which has more distantly placed spikelets 2.6–3.2 mm long and a zigzag rachis (vs. spikelets 1.8–2.2 mm long and a straight rachis in *P. ekmanianum*). Rare in Chiquitania where it is restricted to sandy, superficial soils on Serranía de San Lorenzo (*campo rupestre*), more common on the Andean Piedmont and the montane tropical savannas near Samaipata; flowering April to June. Distribution: apparently a Bolivian endemic. (1980, 2491)

P. erianthum Nees ex Trin., Gram. Panic. 121. 1826.

Common, in *cerrado* and *campo rupestre*. Somewhat palatable (2), although the foliage is

coarse, the relative abundance of this species is markedly decreased in overgrazed savannas. Individual plants are variable within populations for foliage vestiture, inflorescence morphology, and spikelet size; all populations sampled near Concepción exhibited an abnormal meiosis indicating that the species is probably apomictic; flowering is dependent upon fire. Distribution: Central America, Brazil, and Paraguay; Bolivia: Andean Piedmont of Santa Cruz. (1139, 1194, 1369, 2191, 2779)

P. gardnerianum Nees, Hooker's J. Bot. Kew Gard. Misc. 2: 103. 1850. *P. gardnerianum* var. *oligostachyum* Doell in Mart., Fl. Bras. 2(2): 42. 1877. *P. gardnerianum* var. *vestitum* Kuhlman, Comiss. Linhas Telegr. Estratég. Mato Grosso Amazonas 67, Anexo 5, 11: 49. 1922.

Locally abundant on Serranía de San Lorenzo (*campo rupestre*), possibly present on other serranias but overlooked due to lack of flowering populations at time of visits; flowering in April. Distribution: northern South America to Argentina. (1396, 1984)

P. humigenum Swallen, Phytologia 14: 362. 1966. *P. denticulatum* var. *ciliatum* Trin., Sp. Gram. 123. 1829.

Common to abundant in seasonal ponds and inundated savannas; palatable (4); flowering November to (December) January; $2n =$ 20. Distribution: Venezuela and Brazil. (702, 708, 1655, 2246; *Bruderreck* 113 ISC, LPB)

P. inaequivalve Raddi, Agrost. Bras. 28. 1823. *P. inaequivalve* var. *glabriflorum* Hack. ex Stuck., Anales Mus. Nac. Hist. Nat. Buenos Aires 21: 23. 1911. *P. glabriflorum* (Hack.) Herter, Revista Sudamer. Bot. 6: 138. 1940.

Uncommon, forest floor in deep shade and forest/savanna margins; flowering February to May. Distribution: Brazil, Uruguay, and Argentina; Bolivia: Beni and the Yungas. (870, 1753, 2028)

P. intermedium Munro ex Morong, Ann. N.Y. Acad. Sci. 7: 258. 1893.

Very similar and possibly not distinct from *P. plenum* Chase and *P. turriforme* R. W. Pohl of Central and northern South America. Abundant in savanna marsh and seasonally inundated savanna; flowering November (December) to February; abnormal meiosis indicates the species is probably apomictic. Distribution: Brazil, Paraguay, Uruguay, and Argentina. (1631, 1673, 2258)

P. lineare Trin., Gram. Panic. 99. 1826. *P. angustifolium* Nees, Agrost. Bras. 64. 1829, non Leconte, 1820 nec Nees ex Trin., 1826. *P. neesii* Kunth, Révis. Gramin. 1: 25. 1829. *P. tropicum* Doell in Mart., Fl. Bras. 2(2): 83. 1877. *P. furcellatum* S. Moore, Trans. Linn. Soc. London, Bot. 2(4): 505, pl. 34. 1895.

Plants are variable among populations for spikelet size and the presence of a third subdigitate raceme. This species is zonally abundant in sandy soils of valley-side *campos* (upslope) and seasonally humid savanna; it is less common in seasonally inundated savanna and savanna marsh; coarse and unpalatable (0). Flowering is dependent upon fire; abnormal meiosis indicates the species is probably apomictic. Distribution: Mexico and the West Indies to northern Argentina; Bolivia: the Beni. (783, 1160, 1324, 1366, 1803, 2218, 2772)

P. lividum Trin. in Schlect., Linnaea 26: 383. 1854. *P. proliferum* Arechav., Anales Mus. Nac. Montevideo 1: 52. 1894. *P. hieronymii* Hack., Oesterr. Bot. Z. 51: 198. 1901.

Rare, seasonal pond. Distribution: Mexico to Argentina. (1719)

P. maculosum Trin., Gram. Panic. 98. 1826. *Paspalum notatum* var. *maculatum* Nees, Hooker's J. Bot. Kew Gard. Misc. 2: 104. 1850.

Occasional, seasonally humid savanna and valley-side *campos*; palatable (4); flowering from January to April; $2n = 40$. Distribution: northern South America to Uruguay and Argentina. (1640, 1645, 1959, **2282**)

P. malacophyllum Trin., Sp. Gram. 3: pl. 271. 1831. *Anachyris paspaloides* Nees, Hooker's J. Bot. Kew Gard. Misc. 2: 103. 1850.

This species is part of the *Anachyris* group, an extremely variable taxon with several intergrading forms. Burkhart (1969) recognized three species *P. malacophyllum* with leaf blades 1–3 cm wide, *P. simplex* Morong with leaf blades 2–5 mm wide, and *P. elongatum* Griseb. with pilose rachis margins. In Chiquitania the morphology ranges from plants with stout culms, leaf blades 3 cm wide, and large panicles with more than 50 racemes each 10–13 cm long to delicate plants (rarely scandent) with leaf blades about 5 mm wide and panicles with 4–5 racemes, each 2–6 cm long; spikelet size

varies independently, ranging from 1.5 to 2.5 mm long. Significantly, life form is not strictly correlated with habitat and wide-bladed plants can occur in relatively full sunlight (*Killeen 1855*), while narrow-bladed plants can occur underneath a closed canopy (*Killeen 1845*). The entire group is in need of a careful systematic revision. Common, restricted to forest/*cerrado* margins and low scrub; palatable (3); flowering January to (*March*) April; $2n = 40$. Distribution: northern South America to Paraguay; Bolivia: Cochabamba and the Yungas. (1095, 1722, 1727, 1845, 1855, **1918**, 1974, 2330, 2449)

P. malmeanum Ekman, Ark. Bot. 10(17): 12, pl. 4. 1911.

Rare in herbaria but zonally abundant on valley-side *campos* (midslope); foliage coarse and unpalatable (0); flowering April to May; $2n = 20$. Distribution: central Brazil. (898, 2024, 2076, **2478**)

P. minus Fourn., Mex. Pl. 2: 6. 1886.

Rare, forming colonies in disturbed, seasonally humid soils; palatable (4); flowering November to January. Distribution: Mexico to Paraguay; Bolivia: the Yungas. (1521, 1584)

P. multicaule Poir. in Lam., Encycl. Suppl. 4: 309. 1816. *P. papillosum* Sprengel, Novi Provent. 47. 1819.

Common, in seasonally humid sandy soils at top of valley-side *campos* and superficial soils (or small ephemeral ponds) on granitic outcrops; flowering September to May. Distribution: Mexico and the West Indies to Brazil; Bolivia: the Yungas. (796, 903, 1218, 1250, 1535, 1540, 1644, 2025)

P. notatum Flüggé, Gram. Monogr., *Paspalum* 106. 1810. *P. distachyon* Willd. ex Doell in Mart., Fl. Bras. 2(2): 73. 1877. *P. uruguayense* Arechav., Anales Mus. Nac. Montevideo 1: 53. 1894.

The traditional cultivated forage grass of lowland Bolivia; adapted to forest and savanna soils, this species is highly resistant to overgrazing and soil compaction. Although newly introduced exotic species are more productive and offer better-quality forage, this species is still favored for pastures near the ranch house and as a lawn in parks, yards, and football (soccer) fields; occasionally naturalized in humid sandy soils of valley-side *campos*. Populations flower November to (*January*) February; lo-

cal name: *grama negra*. Distribution: Mexico to Argentina. (594, 1637)

P. pallens Swallen, *Phytologia* 14: 365. 1966.

Common, forming dispersed colonies in seasonal ponds and seasonally inundated savanna; palatable (4); flowering November (*January*) to May; $2n = 20$. Distribution: central Brazil. (703, 802, 826, 944, 1421, 1464, 1500, 1532, 1590, **2284**)

P. paniculatum L., *Syst. Nat.* 10(2): 855. 1759.

P. hemisphericum Poir., *Encycl.* 5: 31. 1804.
P. compressicaulis Raddi, *Agrost. Bras.* 29. 1823. *P. supinum* Rupr. ex Galeotti, *Bull. Acad. Roy. Sci. Bruxelles.* 9: 237. 1842. *P. affine* Bello, *Anales Soc. Esp. Hist. Nat.* 12: 125. 1883.

Abundant, as a weed of pastures and roadsides in forest soils; flowering October to June. Distribution: throughout the tropics. (599, 601, 658, 659, 660, 696, 744, 972)

P. parviflorum Rhodé ex Flüge, *Gram. Monogr., Paspalum* 98. 1810. *P. vestitum* Steudel,

Syn. Pl. Glumac. 1: 17. 1854, nomen nudum. *P. parviflorum* var. *humilis* Nees, Doell in *Mart.* 2(2): 45. 1877.

Rare, in seasonal pool on granitic outcrop; flowering in November. Distribution: Central America and the West Indies to Brazil. (1537)

P. pectinatum Nees ex Trin., *Sp. Gram.* 1: 117.

1828. *Anastrophus pectinatus* (Nees ex Trin.) Schlecht. ex B. D. Jacks., *Index Kew.* 1: 1, 118. 1893.

Abundant in *campo rupestre* (Serranía de San Lorenzo and Serranía de Santiago); flowering is dependent upon fire. Distribution: Mexico to southern Brazil; Bolivia: the Beni. (2782A, 2833)

P. pictum Ekman, *Ark. Bot.* 10(17): 11. 1911.

P. maculatum Nash, *N. Amer. Fl.* 17: 186. 1912.

Common, seasonally inundated savanna; flowering November to May. Distribution: Central America to Brazil; Bolivia: Andean Piedmont of Santa Cruz. (810, 945, 1490, 1945, 2087, 2454; *Bruderreck* 261 ISC, LPB)

P. polyphyllum Nees ex Trin., *Gram. Panic.*

114. 1826. *P. blepharophorum* sensu Trin., *Sp. Gram.* 2(11): pl. 134. 1829. *P. disticho-*

phyllum sensu Doell in *Mart.*, *Fl. Bras.* 2(2): 65. 1871. *P. macroblepharum* Hack., *Oesterr. Bot. Z.* 51: 196. 1901. *P. biciliatum* Mez, *Feddes Repert. Spec. Nov. Regni Veg.* 15: 27. 1917.

This species has two variants: sparsely branched, large-leaved plants that grow in relatively well-developed soils and freely branched, small-leaved plants that are rooted in the cracks of granitic outcrops and boulders. The Andean species *P. humboldtianum* Flüge exhibits a similar phenomenon but is distinguished from *P. polyphyllum* by the presence of uniform, lashlike cilia on the upper glume rather than having cilia of irregular length interspersed with stout trichomes. Uncommon, in *campo rupestre* (Serranía de San Lorenzo and Serranía de Santiago); only senescent specimens have been collected (October), probably flowering late in the rainy season (May). Distribution: Brazil, Paraguay, Uruguay, and Argentina; Bolivia: Andean Piedmont and montane tropical grasslands near Samaipata, Santa Cruz. (1398, 2795; *Cutler* 7019 US)

P. pumilum Nees, *Agrost. Bras.* 52. 1829. *P. campestre* Trin., *Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat.* 3: 144. 1835. *P. bicrurulum* Salzm. ex Steudel, *Syn. Pl. Glumac.* 1: 21. 1854.

Rare, ephemeral ponds of granitic outcrops; flowering in November. Distribution: the West Indies to Uruguay and Argentina. (2335)

P. stellatum Humb. & Bonpl. ex Flüge, *Gram. Monogr., Paspalum* 62. 1810. *P. stellatum*

var. *monostachyum* Nees, *Agrost. Bras.* 78. 1829. *P. stellatum* var. *distachyum* Nees, *Agrost. Bras.* 78. 1829. *P. cujabense* Trin., *Sp. Gram.* 3: pl. 284. 1831. *P. wagnerianum* Schlect., *Linnaea* 26: 133. 1853. *P. splendens* var. *sphacelatum* Hack., *Oesterr. Bot. Z.* 51: 239. 1901. *P. stellatum* f. *hirsuta* Hack. in *Stuck.*, *Anales Mus. Nac. Hist. Nat. Buenos Aires* 21: 28. 1911.

Two variants of this species exist in Chiquitania with distinctive morphologies, chromosome numbers, and habitat preferences. The more common genotype (*P. cujabense*) has deep purple rachis wings, spikelets 2 mm long, and a chromosome number of $2n = 20$ (*Killeen* 2487); it is found as a dominant in a zonal sequence on valley-side *campos* (upslope) and in seasonally humid savannas. Less common in herbaria but locally abundant

around Concepción is a more robust genotype (*P. stellatum* var. *monostachyum*) with golden brown rachis wings, spikelets 3 mm long, and a chromosome number of $2n = 32$ with normal meiosis (Killeen 2477); this is restricted to well-drained *cerrado* and frequently forms distinct colonies in association with lateritic crests. The US type fragment (Humboldt & Bonpland s.n.) of this species (sensu lato) has spikelets intermediate to the two genotypes and the traditional circumscription of the species is maintained. Both variants appear to be somewhat palatable (2). Different populations flower asynchronously in March, April, and May; several dozen inflorescences of both genotypes were scored for seed set, but none produced seed. Distribution: Mexico and the West Indies to Argentina; Bolivia: Andean Piedmont of Santa Cruz. (687, 904, 1952, 1998, 2011B, 2458, 2473, 2474, 2477, 2487)

P. urvillei Steudel, Syn. Pl. Glumac. 1: 24. 1854. *P. ovatum* var. *parviflorum* Nees, Agrost. Bras. 43. 1829. *P. larranagae* Arechav., Anales Mus. Nac. Montevideo 1: 60. 1894. *P. dilatatum* var. *parviflorum* Doell in Mart., Fl. Bras. 2(2): 64. 1877.

Not yet collected in Chiquitania. Rare, as a weed in roadside ditches of the Andean Piedmont but more common in the irrigation ditches of the intermontane valleys of the Andes. Distribution: United States to Argentina. (2121, 2508)

P. vaginatum Sw., Prodr. 21. 1788. *P. vaginatum* var. *longipes* Lange, Vidensk. Meddel. Dansk. Naturhist. Foren. Kjobenhavn 1854: 44. 1855.

Seasonal pond with sandy soils. Distribution: throughout the tropics. (1574)

P. virgatum L., Syst. Nat. ed. 10. 2: 855. 1759.

Common, as a weed in disturbed marshes, streamsides, and roadside ditches; flowering October to February; local name: *cortadera*. Distribution: southern United States to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Tarija, Beni, and the Yungas. (585, 716, 1317, 1503; putative hybrids with *P. plicatum* s.l.: 1720, 1721)

P. wrightii Hitchc. & Chase, Contr. U.S. Natl. Herb. 18: 310. September 1, 1917. *P. virgatum* var. *platyaxis* Doell in Mart., Fl. Bras. 2(2): 89. 1877. *P. virgatum* var. *glabriusculum* Doell in Mart., Fl. Bras. 2(2): 89. 1877.

P. plicatum var. *multinode* Hack., Feddes Repert. Spec. Nov. Regni Veg. 6: 342. 1909. *P. platyaxis* (Doell) Mez, Feddes Repert. Spec. Nov. Regni Veg. 15: 73. December 31, 1917. *P. texanum* Swallen, Proc. Biol. Soc. Wash. 55: 94. 1942. *P. luticolum* Swallen, Phytologia 14(6): 373. 1967.

Specimens differ in foliage morphology (blades 2 mm wide and involute to 10 mm wide and planate) and the degree of pigmentation of the upper floret (tawny to dark chestnut brown); apparently allied to sect. *Plicatula*, *P. wrightii* is closely related to *P. hydrophyllum* Henrard, which has larger spikelets (2.5–3 mm). Rare, in seasonally inundated savanna and along streambanks; flowering January to March. Distribution: southern United States to Argentina. (764, 1883)

Paspalum sect. **Plicatula**

An extremely variable species complex with numerous intergrading taxa and a center of diversity in south-central Brazil. Populations with identical morphology and phenology are usually restricted to a narrowly defined habitat and/or local geographic area. Most plants sampled in Chiquitania had abnormal meiosis and dysfunctional pollen development (10–70% not staining in aniline blue); nonetheless, plants consistently produced viable caryopses at low levels of fertility (10–30% of total florets). Infrequent hybridization followed by apomixis is probably responsible for the origination and maintenance of the genetic diversity in this difficult group. Populations differ in stature, foliage morphology (vestiture, length/width ratios, and the compression of the sheath and blade), inflorescence morphology (number, length, and arrangement of racemes), spikelet size (1.5–4.0 mm long), spikelet shape (narrowly elliptic, obovate, orbicular), and the form of the lower lemma (margins thickened or not, plicate wrinkles present or not, bicolored or concolorous). Numerous species and varieties have been described; most modern floristic treatments have recognized certain distinctive and/or well-collected genotypes, while uniting other forms under *P. plicatum*. In Chiquitania, there is a clear correlation between morphology and habitat: populations with conduplicate foliage and small (1.8–2.5 mm long) elliptic spikelets are common in savanna wetland habitats, while populations with planate foliage and larger (2.5–4.0 mm long) widely elliptic to obovate spikelets are common in well-drained *cerrado*. There are exceptions, particularly in central Brazil (e.g., *P. ramosum* Swallen, which

has conduplicate foliage and spikelets 3.2 mm long, is known to occur in humid soils). The following treatment is provisional.

P. atratum Swallen, *Phytologia* 14(6): 378. 1966.
P. plicatulum var. *robustum* Hack., *Bull. Herb. Boissier*, sér. 2 4(3): 269. 1904.

Rare, as a weed in pasture and disturbed places; flowering February to March. Distribution: central Brazil. (1846)

P. gemniflorum Steudel, *Syn. Pl. Glumac.* 1: 25. 1854. *P. plicatulum* var. *oligostachyum* Doell in *Mart., Fl. Bras.* 2(2): 77. 1877. *P. reticulatum* Hack., *Oester. Bot. Z.* 51: 199. 1901.

As in other taxa within sect. *Plicatula*, populations are variable for a number of characters, notably inflorescence morphology and spikelet size; a similar taxon, *P. plicatulum* var. *leptogluma* Pilger, has suborbicular spikelets 2–2.2 mm long. Occasional to locally abundant in *cerrado*; palatable (4); flowering December (*January*) to May. Distribution: northern South America to southern Brazil. (656, 706, 715, 733, 739, 867A, 876, 893, 1618, 1866, 1875, 1877, 1956, 2015, 2443, 2451)

P. guenoarum Arechav., *Anales Mus. Nat. Montevideo* 1: 50. 1894. *P. guenoarum* var. *vestitum* Henrard, *Feddes Repert. Spec. Nov. Regni Veg.* 18: 240. 1922. *P. plicatulum* var. *guenoarum* (Arechav.) Roseng., *Arrill. & Izag., Gram. Urug.* 373. 1970.

Occasional in *cerrado*, particularly on lateritic crests; palatable (4); flowering December to (*February*) March. Distribution: Brazil, Paraguay, Uruguay, and Argentina. (878, 2394)

P. kempffii, Killeen, sp. nov. TYPE: Bolivia. Santa Cruz: Estancia La Pachanga, 5 km S of Concepción, Prva. Ñuflo de Chávez, 16°08'S, 62°05'W, 500 m, *Killeen 2272* (holotype, ISC; isotypes, LPB, F, MO, US, SI, CTE, SP, NY). Figure 5.

P. macedoi Swallen, affinis sed 2–3 racemis, 7–13 cm longis, expansis pedicellis ad apices barbatis a pilis tenuibus 0.2–0.4 mm longis; spiculis 3.6–3.9 mm longis, 2.4–2.7 mm latis, ovatis vel late ellipticis; glumis infernis vestigialibus vel bracteatis anguste triangulariter, 2.5 mm longis, evolutis in dimidiis spicularum; flosculis superis ringentibus, marginalibus lemmatum albis notabilis.

Caespitose perennial from extravaginal innovations; culms erect, 1.2–1.5 m tall; internodes 3–4 mm in diameter, glabrous, ridged, hollow; nodes 3–5 per culm, bearded, the hairs 3 mm long, stiffly ascending. Foliage mainly basal, with the blades reduced above and lacking at the ultimate node; sheaths glabrous, longer than the internodes below, shorter above, keeled, the margins membranous, auriculate; ligules 2.5 mm long, membranous, adnate to the auricle of the sheath; with a wedge-shaped thickening on the abaxial surface between the sheath and the blade; blades 30 cm long at base, 4–6 mm wide, flat or folded, glabrous on the adaxial surface, glaucous on the abaxial surface, the margins smooth, somewhat narrowed at the base, the apex long-acuminate. Inflorescence a panicle of 2–3 racemes placed 5–6 cm apart on a sulcate, glabrous axis; racemes 7–13 cm long, sparsely pilose in the axils, the hairs 5 mm long, stiff; rachis flattened, 1 mm wide, zigzag, bearing spikelets to the tip; pedicels 0.5–1 mm long. Spikelets paired, 3.6–3.8 mm long, 2.5 mm wide, broadly elliptic, strongly plano-convex, disarticulating below the glumes, the back of the upper lemma oriented towards the rachis; a pair of spikelets overlapping the proximal pair by $\frac{1}{3}$ – $\frac{1}{2}$ of their length; a delicate ring of hairs 0.2–0.4 mm long inserted at the base of the bracts. Lower glume lacking, vestigial, or a well-developed, triangular bract 2.5 mm long, distinctly 3-nerved, more regularly developed on the interior spikelet of each pair; upper glume convex, 5–7-nerved, chartaceous, the lateral nerves submarginal, subequaling the upper floret but not covering the apex nor the sides of the upper lemma; lower lemma flat, 7-nerved, the lateral nerves submarginal, chartaceous, green, not bicolored nor with plicate, transverse wrinkles along the unthickened margins; lower palea lacking. Upper floret gaping prior to and after anthesis; upper lemma 3.3–3.6 mm long, broadly elliptic to subglobose, convex, 1.5 mm wide, the apex rounded, dark chestnut brown, cartilaginous, longitudinally striate, the margins white, inrolled, clasping the palea below but not at the apex; upper palea 3–3.3 mm long, subglobose, similar in texture to the upper lemma, with paired lobes at the base enclosing the floral parts. Lodicles 2, truncate, fleshy, 0.8 mm long; anthers 3, 2 mm long, orange; style branches 2, naked and translucent, 0.5 mm long; stigmas plumose, purple, 1.5 mm long, exserted; spikelets chasmogamous.

Locally abundant in *campo cerrado*, particularly over lateritic crests; palatable (3). In addition to several morphological characters, notably the

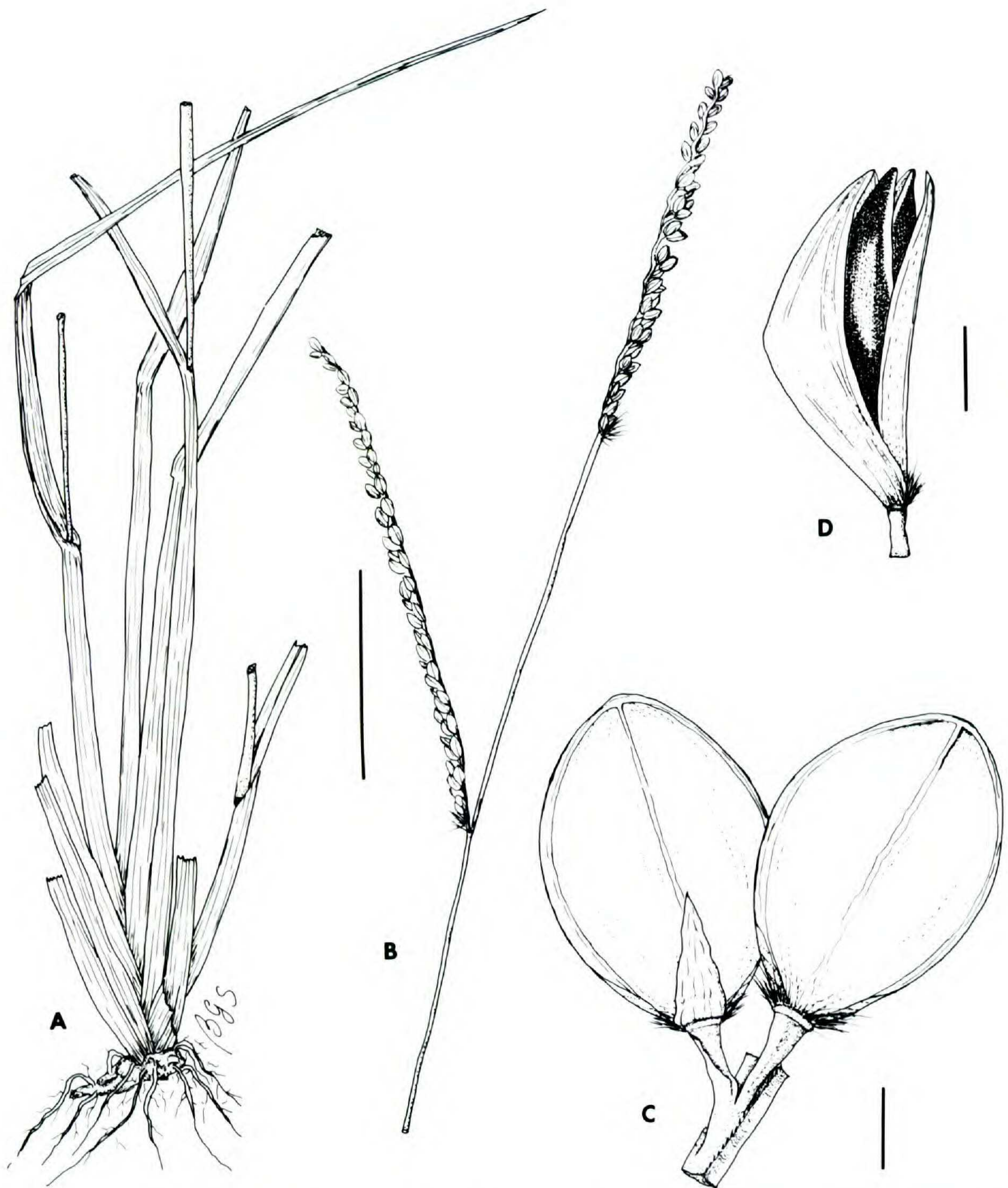


FIGURE 5. *Paspalum kempffii* (Killeen 2272). — A. Habit. — B. Inflorescence (A and B: bar = 5 cm). — C. Ventral view of spikelet pair. — D. Lateral view of spikelet (C and D: bar = 1 mm).

distinctly larger spikelets, this segregate species of the *Plicatula* group differs from similar taxa found in well-drained *cerrado* soils (i.e., *P. plicatulum* s.s., *P. guenoarum*, and *P. macedoi*) by flowering earlier in the rainy season, from December to *January*. An abnormal meiosis ($2n =$ about 28, 3 plants sampled), a high proportion of nonstained pollen grains (57%, 8 plants sampled), and low but consistent levels of seed set (14% of total florets, 13 plants sampled) indicates the species is apomictic.

P. lenticulare H.B.K., Nov. Gen. Sp. 1: 92. 1816. *P. atrocarpum* Steudel, Syn. Pl. Glumac. 1: 25. 1854. *P. humile* Steudel, Syn.

Pl. Glumac. 1: 25. 1854. *P. compressifolium* Swallen, Phytologia 14(6): 381. 1967. *P. paludosum* Swallen, Phytologia 14(6): 379. 1967. *P. pontanalis* Swallen, Phytologia 14(6): 376. 1967. *P. formosum* Swallen, Phytologia 14(6): 379. 1967.

Common to locally abundant in seasonally inundated and humid savannas, less common in valley-side *campos* and very rarely in *cerrado*; flowering September to (*January, February, March*) June, individual populations with distinct phenologies. Distribution: Central America to Argentina. (698B, 699, 707, 765, 771, 789, 822, 842, 858, 865, 1231, 1232, 1492, 1498, 1527, 1557,

1561, 1601, 1765, 1838, 1862, 1874, 1882, 2001, 2111, 2112, 2270, 2279, 2291, 2322, 2396, 2417)

P. lenticulare f. **intumescens** (Doell) Killeen, comb. & stat. nov. BASIONYM: *P. plicatulum* var. *intumescens* Doell in Mart., Fl. Bras. 2(2): 78. 1877.

Although forming distinct populations, the foliage, inflorescence morphology, and spikelet size are similar to that of *P. lenticulare*, and a similar phenomenon of an indurated lower lemma occurs in the related plicatuloid species of *P. convexum* Humb. & Bonpl. ex Willd. and *P. foveolatum* Steudel. In Chiquitania, indurated lower lemmas rarely occur in large-spikelet genotypes as well. Locally abundant at Santa Rosa de la Roca in seasonally humid and shallowly inundated savanna; flowering November to (January) February. (761, 763, 803, 844, 1526, 1667, 1670, 1671, 1723)

P. limbatum Henrard, Blumea 4: 511. 1941.

Common to locally abundant in seasonally humid/inundated savanna; palatable (3); flowering December (January) to February; $2n = 20$, meiosis normal; possibly the diploid progenitor of the apomictic species of sect. *Plicatula*. Distribution: Paraguay and Brazil. (698, 809, 816, 862, 863, 1622, 1669, 1812, 2003, **2276**, 2453)

P. macedoi Swallen, Phytologia 14(6): 377. 1967.

The type of the species has 3–4 racemes 12–16 cm long; material from Chiquitania is similar in spikelet morphology, but inflorescences tend to be somewhat pyramidal (racemes 2–10 cm long). Occasional in *cerrado*, particularly on lateritic crests; flowering January (February) to March. Distribution: central Brazil. (617, 714, 1643, 1781, 1796, 1797, 1827, 2323)

P. plicatulum Michx., Fl. Bor. Amer. 1: 45. 1803. *P. multiflorum* Desv., Opusc. Sci. Phys. Nat. 58. 1831. *P. montevidense* Sprengel, Syst. Veg. 1: 246. 1825. *P. saxatile* Salzm. ex Doell in Mart., Fl. Bras. 2(2): 76. 1877, nomen nudum. *P. plicatulum* var. *longipilum* Hack., Feddes Repert. Spec. Nov. Regni Veg. 6: 342. 1909.

This variant most closely resembles the type fragment of the species (sensu lato), as well as more recent collections from the southern United States where the type collection was made. Different pop-

ulations (genotypes) possibly originated separately via polyploidization and apomixis from diploid genotype(s) or from existing but distinct apomictic populations. Although it is common in most *cerrado* localities, it is locally abundant in ungrazed savannas. The more pubescent genotypes provide the best forage of any native grass in *cerrado* communities; palatable (3–4). Populations flower from January to (March, April) May. Local names: *gamalote*, *camalote*, *gramalote*. Distribution: southern United States to Argentina. (769, 867B, 1657, 1840, 1854, 1865, 1876, 1878, 1917, 1993, 2390, 2444, 2455)

Pennisetum Rich.

Brunken, J. 1977. A systematic study of *Pennisetum* sect. *Pennisetum* (Gramineae). Amer. J. Bot. 64: 161–176. Parodi, L. R. 1925. Las Gramineae del género *Pennisetum*. Anales Mus. Nac. Hist. Nat. Buenos Aires 32: 501–526.

KEY TO SPECIES

- 1a. Inner whorl of bristles ciliate; culms herbaceous, 2–5 mm in diameter.
- 2a. Inner whorl of bristles flattened; spikelets 2–3 per involucre; panicles yellow or green *P. ciliare*
- 2b. Inner whorl of bristles terete; spikelets 1 per involucre; panicles purple *P. setosum*
- 1b. Inner whorl of bristles not ciliate; culms stout, semiwoody, 5–10 mm in diameter.
- 3a. Spikelet stipitate within the involucre; one bristle distinctly longer than the rest; panicles purple *P. purpureum*
- 3b. Spikelet sessile; bristles of various lengths but one not distinctly longer than the rest; panicles yellow *P. nervosum*

P. ciliare (L.) Link., Hort. Berol. 1: 213. 1827. *Cenchrus ciliaris* L., Mant. 302. 1771; see DeLisle (1963) for extensive synonymy.

Cultivated forage grass adapted to the sandy soils of the Gran Chaco; flowering in October; local names: *bufel*, *bufelo*. (1258)

P. nervosum (Nees) Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 3: 177. 1835. *Gymnotrix nervosa* Nees, Agrost. Bras. 277. 1829. *Cenchrus nervosus* (Nees) Kuntze, Rev. Gen. Pl. 3(3): 347. 1898.

Rare, roadside embankment; flowering in January. Distribution: Ecuador, Argentina, and Brazil. (1690)

P. purpureum Schum., Beskr. Guin. Pl. 44. 1827.

Cultivated forage grass of African origin; due to its robust stature and stout woody culms, the forage must be harvested by hand and fed to cattle; utilized to a limited extent on almost all estancias; local names: mercurón, elefante. (979)

P. setosum (Sw.) L. Rich. in Pers., Syn. Pl. 1: 72. 1805. *Cenchrus setosus* Sw., Prodr. 26. 1788. *Panicum cenchroides* L. Rich., Actes Soc. Hist. Nat. Paris 1: 106. 1792, non Lam., 1798 nec Elliott, 1816. *Pennisetum pallidum* Nees, Agrost. Bras. 285. 1829.

Similar to *P. polystachyon* (L.) Sw., an Old World annual species; however, material from Chiquitania is clearly perennial with short, stout rhizomes. Occasional in scrub on margins of granitic outcrops, rarely in *cerrado*; flowering December to July. Distribution: Mexico and the West Indies to Brazil; Bolivia: the Yungas. (635, 839, 1821, 2007)

Pharus R. Browne

Judziewicz, E. J. 1987. Taxonomy and morphology of the tribe Phareae. Ph.D. Dissertation. Univ. of Wisconsin, Madison, Wisconsin.

P. lappulaceus Aubl., Hist. Pl. Guiane 2: 859. 1775. *P. glaber* H.B.K., Nov. Gen. Sp. 1: 196. 1816. *P. pubescens* Sprengel, Neue Entdeck. Pflanzenk. 1: 241, p. 1, f. 1-4. 1820. *P. brasiliensis* Raddi, Agrost. Bras. 21. 1823. *P. micranthus* Schrader ex Nees, Agrost. Bras. 302. 1829. *P. angustifolius* Doell in Mart., Fl. Bras. 2(2): 23. 1871. *P. latifolius* L. var. *parviflorus* (Doell) Prodoehl, Bot. Arch. 1: 250. 1922.

Occasional, in deep shade of seasonal forest. Distribution: Mexico and the West Indies to Argentina; Bolivia: the Yungas. (547, 676, 832, 1773, 1890, 1965)

Rhipidocladum McClure

R. racemiflorum (Steudel) McClure, Smithson. Contr. Bot. 9: 106. 1973. *Arthrostylidium racemiflorum* Steudel, Syn. Pl. Glumac. I: 336. 1854.

Occasional, a liana in seasonal forest; palatable (3); local name: *taquara*. Distribution: Central America to Peru; Bolivia: the Yungas. (729, 751, 2447, 2734)

Rhynchelytrum Nees

R. repens (Willd.) C. E. Hubb., Bull. Misc. Inform. (1934): 110. 1934. *Saccharum repens* Willd., Sp. Pl. 1: 322. 1791. *Tricholaena rosea* Nees, Linnaea 11: 129. 1837. *R. roseum* (Nees) Stapf & C. E. Hubb. 9(5): 880. 1930.

Rare, roadside weed; flowering in October. Distribution: throughout the tropics. (2827)

Rhytachne Desv.

R. subgibbosa (Winkl. ex Hack.) W. D. Clayton, Kew Bull. 20: 261. 1966. *Rottboellia loricata* Trin. subsp. *subgibbosa* Winkl. ex Hack. in Mart., Fl. Bras. 2(3): 311. 1883. *Rottboellia loricata* Trin. subsp. *glaberrima* Hack. in Mart., Fl. Bras. 2(3): 311. 1883.

Rare, San Ignacio de Velasco. Distribution: Brazil, Paraguay, and Argentina. (*Bruderreck* 149 ISC, LPB)

Saccharum L.

Molina, A. M. 1981. El genero *Erianthus* (Gramineae) en la Argentina y paises limítrofes. Darwiniana 23: 559-585. Swallen, J. 1966. Notes on grasses. Phytologia 14(2): 91-95.

KEY TO SPECIES

- 1a. Spikelets awned, 6-8 mm long; rachis internodes $\frac{1}{2}$ - $\frac{2}{3}$ the length of the spikelet; foliage basal, the sheaths strictly equitant and covered with a thick, chalky wax *S. trinii*
1b. Spikelets awnless, 3.5-4.5 mm long; rachis internode as long as or twice the length of the spikelet; foliage cauline, the sheaths rounded on the back, not covered with chalky wax
..... *S. officinarum*

S. officinarum L., Sp. Pl. 54. 1753.

Sugar cane, cultivated on a small scale in Chiquitania for sugar production and fodder for livestock, particularly pigs; cultivated commercially on the alluvial plains near Santa Cruz de la Sierra; flowering April to July. (2120, 2445)

S. trinii (Hack.) Renv., Kew Bull. 39: 184. 1984. *S. saccharoides* var. *trinii* Hack. in Mart., Fl. Bras. 2(3): 258. 1883. *Erianthus trinii* (Hack.) Hack. in A. DC., Monogr. Phan. 6: 135. 1889. *E. balansae* Hack. in A. DC., Monogr. Phan. 6: 133. 1889. *E. purpureus* Swallen, Phytologia 14: 92. 1966. *E. gla-*

brinodis (Hack.) Swallen, *Phytologia* 14: 93. 1966.

Individuals are variable within and between populations in their foliage vestiture (velutinous to scabrous) and spikelet pubescence (glumes villous, ciliate, or glabrous; callus hairs less than or surpassing the glumes). When burned, populations flower en masse within four weeks producing purple, chasmogamous spikelets on racemose, exserted panicles. Unburned populations bloom irregularly from December to May, producing pale tan, cleistogamous spikelets in globose panicles, which are included or only slightly exserted from the sheaths. These variants intergrade, and intermediate individuals have been observed in wet savannas which were only superficially burned and along the interface of burned and unburned savanna patches. Zonally abundant on valley-side *campos* (downslope) and in savanna marsh (providing more than 25% of the herbaceous cover), occasional in seasonally inundated savanna, seasonal ponds, and laguna margins; unpalatable (0). Distribution: Mexico to Argentina; Bolivia: the Beni and the Yungas. (cleistogamous phenotypes: 646, 767, 1787, 1806, 2281, 2589; chasmogamous phenotypes: 590, 1340, 2219; intermediate phenotypes: 1135, 1460, 2776)

Sacciolepis Nash

KEY TO SPECIES

- 1a. Foliage succulent, reddish, the blades flat; panicles 10–30 cm long; spikelets glabrous, nerves of glumes and lower lemma indurate *S. myuros*
- 1b. Foliage not succulent, green, the blades involute; panicles 6–8 cm long; spikelets glabrous

KEY TO SPECIES

- 1a. Racemes flexuous, the rachis internodes and pedicels recurved *S. microstachyum*
- 1b. Racemes straight, the rachis internodes and pedicels not recurved, erect and appressed to the spikelet.
 - 2a. Blades 2–7 cm long; rachis internodes delicate, 0.2–0.6 mm wide at apex; annuals or of indefinite duration, decumbent or scandent; foliage strictly cauline.
 - 3a. Culms profusely branched above to form a compound panicle of numerous exserted racemes; rachis internodes about 0.2 mm wide at apex; sessile spikelet 3 mm long, the lower glume with a medial groove or dark line *S. sulcatum*
 - 3b. Culms sparsely branched; racemes few to several, not exserted and borne singly at the nodes of the culm; rachis internodes 0.4–0.6 mm wide at apex; sessile spikelet 4 mm long, the lower glume rounded on the back *S. maclaudii*
 - 2b. Blades 10–70 cm long; rachis internodes 0.8–1.0 mm wide at apex; caespitose perennials; foliage basal and cauline.
 - 4a. Racemes solitary (rarely 2), terminal, exserted; pedicellate spikelet 3–6 mm long, awnless, strongly nerved; foliage strictly basal *S. tenerum*
 - 4b. Racemes 4–50 borne at the upper nodes, the base usually included in the sheath; pedicellate spikelets 0.5–2.5 mm long, subaristate, not strongly nerved; foliage basal and cauline.
 - 5a. Lower glume of sessile spikelet strongly concave, coriaceous *S. sanguineum*
 - 5b. Lower glume of sessile spikelet flat or weakly concave, cartilaginous or chartaceous.
 - 6a. Lower glume of sessile spikelet scabrous, cartilaginous; pedicellate spikelet up to 1 mm long *S. scabriflorum*
 - 6b. Lower glume of sessile spikelet smooth, chartaceous; pedicellate spikelet 2–2.5 mm long *S. beckii*

or hirsute, nerves of glumes and lower lemma not indurate *S. angustissima*

S. angustissima (Hochst.) Kuhl., *Comiss. Linhas Telegr. Estratég. Mato Grosso Amazonas* 67, Anexo 5, Bot. 11: 92. 1922. *Panicum angustissimum* Hochst. ex Steudel, *Syn. Pl. Glumac.* 1: 66. 1854. *S. karsteniana* Mez, *Feddes Repert. Spec. Nov. Regni Veg.* 15: 123. 1918.

Common to locally abundant, valley-side *campos* (midslope), seasonally inundated savannas, savanna marshes and seasonal ponds; flowering March to (May) June, and irregularly throughout the year; $2n = 36$. Distribution: Venezuela and the Guianas to central Brazil. (593, 688, 902, 1136, 1198, 1325, 1429, 1641, **1871**, 1946, 2027, 2452)

S. myuros (Lam.) Chase, *Proc. Biol. Soc. Wash.* 21: 7. 1908. *Panicum myuros* Lam., *Tabl. Encycl.* 1: 172. 1791.

Common, seasonally inundated or humid savannas, valley-side *campos*, and seasonal ponds; usually along cow paths; flowering November to (May) July. Distribution: Mexico to Brazil and Paraguay; Bolivia: Andean Piedmont of Santa Cruz, Chapare, Beni, and the Yungas. (889, 1117, 1253, 2022, 2119, 2603)

Schizachyrium Nees

Türpe, A. M. 1983. Revision of the South American species of *Schizachyrium* (Gramineae). *Kew Bull.* 39: 169–178.



FIGURE 6. *Schizachyrium beckii* (Killeen 1987).—A. Habit and compound inflorescence (bar = 5 cm).—B. Spikelet pair (bar = 1.5 mm).—C. Lower glume of the sessile spikelet (bar = 1 mm).

S. beckii Killeen, sp. nov. TYPE: Bolivia. Santa Cruz: Serranía de San Lorenzo 10 km W of San Javier, Prva. Ñuflo de Chavez, 16°15'S, 62°40'W, 900 m, 17 Apr. 1986, Killeen 1987 (holotype, ISC; isotypes, LPB, F, MO, US, ISC). Figure 6.

S. sanguineum (Retz.) Alston affinis sed culmis ramicantibus copiose ad nodos superiores formantibus paniculas compositas elongatas, 40–60 racemis spathiformibus; spathis 1.5–2.0 cm longis; racemis 1–3 cm longis, spiculis

4–6 binatis; internodiis rachidium 3.0–3.5 mm longis, callis minutis 0.3 mm longis, non induratis valde; glumis inferis lanceolatis, planis, chartaceis, nec convexis nec coriaceis, 0.7 mm latis notabilis.

Caespitose perennial bunch grass; innovations intravaginal; culms solid, 4.5 mm wide, compressed, glabrous, smooth, branched at the upper nodes. Foliage basal and cauline; sheaths glabrous, keeled, strongly equitant, longer than the internodes; ligule membranous, 2 mm long; blades flat

TABLE 5. Morphological variation for selected characters in the *Schizachyrium microstachyum* complex.

Specimen ¹	Panicle	Rachis internodes	Spikelet size (mm)	Habitat preference	Flowering phenology	Latitude	Region
2594	elongate	strongly recurved	4	seasonally humid	July	14°35'S	Beni
1572	elongate	weakly recurved	5-6	well drained	January	17°40'S	Andean Piedmont of Santa Cruz
1566	corymbose	strongly recurved	4	seasonally humid	January	17°40'S	Andean Piedmont of Santa Cruz
724	corymbose	strongly recurved	4	seasonally humid	January	16°05'S	Chiquitania
2475	elongate	weakly recurved	4-5	well drained	May	16°05'S	Chiquitania

¹ All specimens those of the author.

or folded, glaucous, up to 23 cm long, reduced at the upper nodes, abruptly narrowed at the base, the junction between the blade and the sheath indistinct, the apex carinate. Inflorescence an elongate, compound panicle of spatheate racemes; spathes 1.5-2 cm long; racemes of 4-6 pairs of spikelets, 1-3 cm long, not exerted; rachis internodes ciliate, 3-3.5 mm long, broadest at the apex, narrowed at the base, coriaceous, not inflated; pedicels slender, flattened, 2.5-3 mm long, 1 mm wide; the rachis internode and pedicel united at base to form a short callus 0.3 mm long, the callus hairs 1 mm long. Sessile spikelet 5 mm long, inclusive of the callus; lower glume as long as the spikelet, lanceolate, chartaceous, dorsally compressed, flat, 0.7 mm wide, with 2 submarginal, minutely scabrous keels, the apex minutely bidentate, the mid-nerve suppressed; upper glume laterally compressed, keeled, 4.5 mm long, 0.5 mm wide when folded; lower lemma hyaline, similar to the lower glume, the palea lacking; upper lemma hyaline, 3.5 mm long, awned from between two lobes 2.5 mm long, the awn 17 mm long, 1-geniculate, the palea vestigial, 0.2 mm long; lodicules 2, truncate, evidently nerved; stamens 3, the anthers 2 mm long, reddish; style branches 2, naked at base, the stigmas plumose, 1.5 mm long. Pedicellate spikelet vestigial, 2-2.5 mm long, 0.2 mm wide, a single awned bract, the awn 2.5 mm long, inserted between 2 minute teeth.

This species is allied to the *S. sanguineum* complex but has smaller spikelets 5 mm (vs. 6.5-8 mm) long, the flat, chartaceous lower glume of the sessile spikelet (vs. strongly convex and coriaceous), a callus 0.3 (vs. 0.5-1) mm long, and the highly branched compound panicle with 40-60 (vs. 5-25) racemes. Similar in some respects to *S. riedelii* var. *multirameus* Hack., with which it shares the large compound panicle; however, the latter species has the strongly convex, coriaceous

lower glume typical of *S. sanguineum* s.l. Locally abundant in *campo rupestre* and occurring with typical variants of *S. sanguineum* (i.e., Killeen 1985).

S. maclaudii (Jacques-Félix) S. T. Blake, Proc. Roy. Soc. Queensland 80(6): 78. 1969. *S. brevifolium* var. *maclaudii* Jacques-Félix, Rev. Inst. Bot. Appl. Agric. Trop. 32: 432, f. 5b. 1953.

Similar to *S. brevifolium* (Sw.) Nees, which has smaller spikelets (3 vs. 4 mm), slender rachis internodes (0.2 vs. 0.6 mm wide at apex), and shorter (2-4 cm vs. 3-8 cm), more blunt leaf blades; in addition, some specimens from Chiquitania have a glabrous callus similar to local forms of *S. sulcatum*. Inconspicuous, in rank vegetation of seasonally inundated savanna or shallowly rooted in superficial soils of granitic outcrops (plants then caespitose and annual); flowering May to July. Distribution: northern South America and Brazil. (915, 2084, 2606)

S. microstachyum (Desv. ex Ham.) Roseng., Arrill. & Izag., Bol. Fac. Agron. Montevideo. 103: 35. 1968. *Andropogon microstachyus* Desv. ex Ham., Prodr. Pl. Ind. Occid. 8. 1825. *A. scoparius* C. Presl, Rel. Haenk. 1: 338. 1830, non Michx., 1803. *A. paniculatus* Kunth, Enum. Pl. 1: 494. 1833, non Lam., 1778. *A. lhotzkyi* Steudel, Syn. Pl. Glumac. 384. 1855. *Andropogon condensatus* subsp. *elongatus* Hack. in Mart., Fl. Bras. 2(3): 297. 1883. *S. paniculatum* (Kunth) Herter, Revista Sudamer. Bot. VI (5-6): 135. 1940. *S. neoscoparium* Herter, Revista Sudamer. Bot. VI (6-8): 193. 1943. *S. microstachyum* subsp. *elongatum* (Hack.) Roseng., Arrill. & Izag., Bol. Fac. Agron. Montevideo 103: 37. 1968.

A polymorphic species complex with numerous intergrading geographic races and ecotypes. In eastern Bolivia four phenotypes with distinct morphology, phenology, and habitat distribution have been documented (Table 5). Common in *cerrado* throughout Chiquitania, as well as in well-drained and seasonally humid savannas with sandy soils of the Andean Piedmont and the seasonally humid savannas with heavy clay soils in the Beni; palatable (4); flowering April to (May) July in Chiquitania; $2n = 20$. Distribution: Central America to Argentina and Uruguay. (Chiquitania: 724, 859, 875, 896, 990, 1093, 1121, 1273, 1509, 1552, 1572, 1816, 1842, 2012, 2058, 2289, 2475, **2483**; Beni: 2594; Andean Piedmont of Santa Cruz: 1566, 1572, 2289, 2296; Steinbach 6809, 6950, 6951, 6952, 6953 US)

S. sanguineum (Retz.) Alston, Suppl. Fl. Ceylon 334. 1931. *Rottboellia sanguinea* Retz., Observ. Bot. 3: 25. 1783. *S. hirtiflorum* Nees, Agrost. Bras. 334. 1829. *S. semiberbe* Nees, Agrost. Bras. 336. 1829. *Andropogon hirtiflorus* (Nees) Kunth, Révis. Gramin. 2(39). 1832. *A. semiberbis* (Nees) Kunth, Révis. Gramin. 2(39). 1832. *A. riedelii* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 2: 263. 1832. *S. riedelii* (Trin.) A. Camus, Ann. Soc. Linn. Lyon 70: 88. 1923. *S. weberbaueri* Pilger, Notizbl. Bot. Gart. Berlin-Dahlem 8: 452. 1923.

Plants vary in foliage vestiture, the length/width ratio of leaf blades, pubescence of racemes, and the form of the lower glume of the sessile spikelet. Monomorphic populations with glabrous racemes are zonally abundant upslope in valley-side *campos* (*S. semiberbe* sens. str.), while *cerrado* populations are polymorphic and are composed of a mixture of intergrading genotypes each with a unique phenology. Typically, a colony with some distinctive trait (such as glaucous foliage or densely pubescent racemes) is associated with a restricted area of gravel soils developed over a laterite crest, while another genotype is randomly distributed in the well-drained, red clay soils common to *cerrado* communities; palatability between genotypes is variable (3–4); flowering January (February to May) to July; $2n = 50$ –60, an abnormal meiosis

Setaria P. Beauv.

KEY TO SPECIES

- 1a. Leaf blades pleated, palmlike, 4–15 cm wide; spikelets about 3 mm long *S. poiretiana*
 1b. Leaf blades not pleated, 0.3–3 cm wide; spikelets 1.5–2.5 mm long.
 2a. Bristles with retrorse scabrosities at tips, as well as antrorse scabrosities below, the panicles adhering to clothing *S. scandens*

indicates that the species is apomictic. Distribution: throughout the tropics but the greatest morphological diversity is found in the New World; Bolivia: Beni and the Yungas, absent from the savannas of the Andean Piedmont of Santa Cruz. (Pubescent variants: *S. hirtiflorum* (sens. str.): 1010, 1551, 2010, 2093, 2476, 2479, **2486**, 2629; glabrous variants: *S. semiberbe* (sens. str.): 732, 855, 1636, 1783, 1835, **1851**, 2018, 2026, 2095, **2421**, **2442**; intermediate variants: 909, 1390, 1960, 1985, 1997, 2094, 2485, 2629)

S. scabriflorum (Rupr. ex Hack.) A. Camus, Ann. Soc. Linn. Lyon 70: 89. 1923. *Andropogon scabriflorus* Rupr. ex Hack. in Martius, Fl. Bras. 2(3): 299. 1883.

Occasional in *cerrado*; palatable (4); flowering January to (February) May; $2n = 40$. Distribution: central Brazil. (857, 879, 1619, 1772, 1829, 1852, 1996, **2328**)

S. sulcatum (Ekman) S. T. Blake, Proc. Roy. Soc. Queensland 80(6): 78. 1969. *Andropogon sulcatus* Ekman, Ark. Bot. 10(7): 4, p. 1, f. 3 & p. 6, f. 3. 1911. *A. brevifolius* var. *leptanthus* Hack. in A. DC., Monogr. Phan. 6: 364. 1889.

Rare, seasonally humid savanna near San Ignacio de Velasco; flowering in February. Distribution: Colombia and Brazil; Bolivia: the Beni. (*Bruderreck 195* ISC, LPB)

S. tenerum Nees, Agrost. Bras. 336. 1829. *S. filiforme* Nees, Agrost. Bras. 338. 1829. *Andropogon gracilis* C. Presl, Rel. Haenk. 1(4/5): 336. 1830, non Sprengel, 1825. *A. preslii* Kunth, Révis. Gramin. 2(32): 489. 1831. *A. tener* (Nees) Kunth., Révis. Gramin. 2(39): 565. 1832. *A. neesii* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 2: 264. 1832, non Kunth, 1832. *A. campestris* Kunth, Révis. Gramin. 3(41–44): 617. 1833.

Rare, seasonally humid savanna and valley-side *campo*; flowering February to March. Distribution: Central America to Argentina; Bolivia: Andean Piedmont of Santa Cruz and the Yungas. (1775, 1802, 1831)

- 2b. Bristles antrorsely scabrose only, the panicles not adhering to clothing.
3a. Pedicels adnate to 5 or more bristles *S. parviflora*
3b. Pedicels adnate to a single bristle.
4a. Leaves with an external ligule or ridge of thickened tissue on the abaxial surface at the junction of the blade and sheath, the blades 1–3 cm wide *S. vulpiseta*
4b. Leaves lacking an external ligule, the blades 0.5–1.5 cm wide.
5a. Upper floret strongly rugose, broadly ovate; annuals *S. fiebrigii*
5b. Upper floret smooth or weakly rugose, elliptic; perennials *S. leiantha*

S. fiebrigii R. Herrm., Beitr. Biol. Pflanzen 10: 30. 56. 1910.

bristled variant: 645, 1245, 1499, 1628, 2116, 2259, **2274**, 2327)

Occasional weed in sandy soils near San José de Chiquitos; flowering January to February? Distribution: Brazil, Paraguay, and Argentina; Bolivia: the Gran Chaco. (1286, 1697, 1698, 1703)

S. leiantha Hack., Anales Mus. Nac. Hist. Nat. Buenos Aires 4: 78. 1904. *S. argentina* R. Herrm., Beitr. Biol. Pflanzen 10: 30, 56. 1910. *Chaetochloa argentina* (Herrm.) Hitchc., Contr. U.S. Natl. Herb. 24(8): 480. 1927.

S. poiretiana (Schrader) Kunth, Révis. Gramin. 1: 47. 1829. *Panicum elongatum* Poir. in Lam., Encycl. Suppl. 4: 278. 1816, non Salisb., 1824 nec Pursh, 1814. *P. poiretianum* Schultes, Mant. 2: 229. 1824. *P. flabellatum* Steudel, Syn. Pl. Gram. 53. 1854. *Chaetochloa poiretiana* (Schultes) Hitchc., Contr. U.S. Natl. Herb. 22: 159. 1920.

Rare, logging roads in seasonal forests; flowering December to March. Distribution: Central America to Brazil; Bolivia: the Yungas, Chapare, and Cerro Amboró in western Santa Cruz. (680, 1856)

Occasional, as a weed in San José de Chiquitos. Distribution: Paraguay, Argentina, and Uruguay; Bolivia: Cochabamba and the Gran Chaco. (1260, 1706)

S. scandens Schultes, Mant. 2: 279. 1824. *S. trinii* Kunth, Enum. Pl. 1: 151. 1833. *Panicum scandens* var. *vulgare* Doell in Mart., Fl. Bras. 2(2): 171. 1877. *Chaetochloa scandens* (Schultes) Scribn. in J. D. Smith, Pl. Guatem. 5: 91. 1899.

Occasional, as a weed in savanna and forest soils. Distribution: Mexico to Paraguay; Bolivia: the Yungas. (804, 807, 838, 866)

S. parviflora (Poir.) Kerguelen, Lejeunia 120: 161. 1987. *Cenchrus parviflorus* Poir. in Lam., Tabl. Encycl. 6: 52. 1804. *S. geniculata* (Lam.) P. Beauv., Ess. Agrostogr. 51, 178. 1812. *S. gracilis* H.B.K., Nov. Gen. Sp. 1: 109–110. 1816. *S. purpurascens* H.B.K., Nov. Gen. Sp. 110. 1816. *P. imberbis* Poir. in Lam., Encycl. Suppl. 4: 272. 1816. *S. imberbis* (Poir.) Roemer & Schultes, Syst. Veg. 2: 891. 1817. *P. flavum* Nees, Agrost. Bras. 238. 1829. *P. dasyurum* Nees, Agrost. Bras. 238. 1829. *P. penicillatum* Willd. ex Nees, Agrost. Bras. 238. 1829. *Chaetochloa geniculata* (Lam.) Millsp. & Chase, Field. Mus. Nat. Hist., Bot. Ser. 3: 37. 1903.

S. vulpiseta (Lam.) Roemer & Schultes, Syst. Veg. 2: 495. 1817. *Panicum vulpisetum* Lam., Encycl. 4: 735. 1798. *S. composita* H.B.K., Nov. Gen. Sp. 1: 111. 1816. *Chaetochloa vulpiseta* (Lam.) Hitchc. & Chase, Contr. U.S. Natl. Herb. 18: 350. 1917.

Individuals of this species vary in stature, the length/width ratio of leaf blades, and size of inflorescence; however, the external ligule is characteristic. Common, in forest scrub, on forest/savanna margins, and as a weed along roads in forest soils; rarely occurring in the deep shade of seasonal forest; flowering January to (March) July. Distribution: Mexico to Paraguay; Bolivia: Andean Piedmont of Santa Cruz and the Beni. (829, 834, 847, 999, 1079, 1674, 1744, 1884, 2106, 2318)

A pantropical species which varies in a number of characters when studied over its entire geographic range. In eastern Bolivia, the typical (more variable) variant occurs in well-drained habitats as a common weed. However, a well-defined genotype characterized by elongate internodes, glaucous foliage, and reduced bristles is restricted to seasonally inundated savannas. The short-bristled variant has a chromosome number of $2n = 72$; previous reports for the species are $2n = 18$ and 36 (Gould, 1960). Distribution: throughout the tropics. (common variant: 525, 588, 679, 711, 1507, 1710, 1766, 1814, 1627, 2227, 2273, 2389; short-

Sorghastrum Nash

Dávila, P. A. 1988. Systematic revision of the genus *Sorghastrum* (Poaceae, Andropogo-

neae). Ph.D. Dissertation. Iowa State Univ., Ames, Iowa.

KEY TO SPECIES

- 1a. Awns stout, 5–10 cm long, pubescent, 2-geniculate; spikelets 7–9 mm long, the callus pungent *S. minarum*
1b. Awns delicate, 1–8 mm long, glabrous, twisted or 1-geniculate; spikelets 3.5–4.5 mm long, the callus blunt *S. setosum*

S. minarum (Nees) Hitchc., Contr. U.S. Natl. Herb. 24: 501. 1927. *Trachypogon minarum* Nees, Agrost. Bras. 349. 1829. *Andropogon minarum* (Nees) Kunth, Révis. Gramin. 2(33): 507. 1831. *Stipa penniglumis* Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1: 77. 1831. *Sorghum minarum* (Nees) Hack. in Mart., Fl. Bras. 2: 276. 1883. *Chrysopogon minarum* (Nees) Benth., J. Linn. Soc., Bot. 9: 73. 1881.

Similar to *S. balansae* Hack., which has an open panicle, a smaller callus (1 mm vs. 2.5 mm) and shorter awn (1.5–2.5 mm vs. 6–8.5 cm). Uncommon, *cerrado* and along *cerrado*/forest margins; flowering February to (April) May; $2n = 20$. Distribution: Brazil, Paraguay, and Argentina; Bolivia: Andean Piedmont of Santa Cruz. (1768, 1843, 1994, **2387**)

S. setosum (Griseb.) Hitchc., Contr. U.S. Natl. Herb. 12(6): 195. 1909. *Sorghum parviflorum* Desv. ex Ham., Prodr. Pl. Ind. Occid. 12. 1825, non P. Beauv., 1812. *Trachypogon stipoides* (H.B.K.) Nees var. *beta* Nees, Agrost. Bras. 351. 1829. *Andropogon setosus* Griseb., Cat. Pl. Cub. 235. 1866. *A. francavillanus* Fournier, Mex. Pl. 2: 56. 1881. *A. agrostoides* Speg., Anales Soc. Ci. Argent. 16: 136. 1883. *S. nutans* subsp. *micranthum* var. *submuticus* (Hack.) Hack. in Mart., Fl. Bras. 2(3): 275. 1883. *Sorghastrum parviflorum* (Desv.) Hitchc. & Chase, Contr. U.S. Natl. Herb. 18: 287. 1917. *S. stipoides* (H.B.K.) Nash. subsp. *agrostoides* (Speg.) Roseng., Arrill. & Izag., Gram. Urug. 201. 1970.

Occasional, in valley-side *campo*, savanna marsh, and seasonally humid savanna but locally abundant in some seasonally inundated savannas; flowering January (February) to May; $2n = 20$. Distribution: Central America to Argentina; Bolivia: Andean Piedmont of Santa Cruz. (846, 861, 885, 1630, 1764, 1811, 1958, 1991, 2114, **2306**, 2382)

Sorghum Moench

KEY TO SPECIES

- 1a. Rhizomatous perennials; caryopsis concealed by the glumes *S. halapense*
1b. Caespitose annuals; caryopsis usually bursting from the glumes *S. bicolor*

S. bicolor (L.) Moench, Meth. Pl. 207. 1794. *Holcus bicolor* L. Mant. Pl. 2: 301. 1771.

Newly introduced forage sorghums are being used by large estancias for fattening cattle; local name: *sorgo*, *sorgo forrajero*. (2446)

S. halepense (L.) Pers., Syn. Pl. 1: 101. 1805. *Holcus halepensis* L., Sp. Pl. 1047. 1753.

Common, as a weed along roadsides, particularly in the fertile soils of the alluvial plains SW of the Brazilian Shield; an important source of forage on cattle drives, palatable (3); flowering October to January. Distribution: throughout the tropics. (692, 1314)

Sporobolus R. Br.

Clayton, W. D. 1965. The *Sporobolus indicus* complex. Kew Bull. 19: 287–295.

KEY TO SPECIES

- 1a. Inflorescence a pyramidal panicle, at least the lowermost branches verticillate.
2a. Spikelets about 1.5 mm long; glumes and lemma white or translucent; caespitose annuals *S. pyramidatus*
2b. Spikelets 2.5–3.5 mm long; glumes and lemma golden-purple-colored; caespitose perennial bunch grasses.
3a. Panicle branches reflexed or spreading at maturity; leaf blades involute, 1–3 mm wide *S. cubensis*
3b. Panicle branches ascending or flexuous; leaf blades flat or folded, 5–15 mm wide *S. sprengeii*
1b. Inflorescence an open or contracted panicle; branches not verticillate, if several per node, then inserted on one side.
4a. Spikelets 0.8–1 mm long; stamens 1; panicles open; delicate caespitose annuals *S. monandrus*
4b. Spikelets 1.5–2.5 mm long; stamens 3; panicles contracted or open; perennial bunch grasses.
5a. Panicle branches strictly erect and appressed to axis *S. indicus* var. *exilis*
5b. Panicle branches ascending to spreading *S. jacquemontii*

S. cubensis Hitchc., Contr. U.S. Natl. Herb. 12: 237. 1909.

Rare, sandy soils of transition zone between *cerrado* and valley-side *campo* (Santa Rosa de la Roca); flowering is dependent upon fire. Distribution: West Indies to Brazil. (2826)

S. indicus var. **exilis** (Trin.) Koyama, J. Jap. Bot. 37: 235. 1962. *Agrostis tenacissima* Jacq., Icon. Pl. Rar. 16. 1787, non L.f., 1781. *Vilfa tenacissima* sensu H.B.K., Nov. Gen. Sp. 1: 138. 1816. *Axonopus poiiretii* Roemer & Schultes, Syst. Veg. 2: 318. 1817. *Vilfa exilis* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 6(1): 89. 1840. *Sporobolus berterioanus* (Trin.) Hitchc. & Chase, Contr. U.S. Natl. Herb. 18: 370. 1917. *S. poiiretii* (Roemer & Schultes) Hitchc., Bartoniana 14: 32. 1932.

Not yet collected in Chiquitania but common as a pioneer species on the sand dunes of the Andean Piedmont; flowering throughout the year. Distribution: southern United States to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Cochabamba, Beni, and the Yungas. (1116, 1582)

S. jacquemontii Kunth, Révis. Gramin. 2: 427, t. 127. 1831. *Vilfa jacquemontii* (Kunth) Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 6: 92. 1840. *S. indicus* sensu Hitchc., Contr. U.S. Natl. Herb. 24(8): 393. 1927.

Common, as a weed of roadsides and pastures, in forest or savanna soils; occasional, in well-drained or seasonally humid savannas; locally abundant in *cerrado* SW of San Javier; coarse but somewhat palatable (2); flowering October to (November) April. Distribution: United States to Argentina; Bolivia: Andean Piedmont of Santa Cruz, Cochabamba, Beni, and the Yungas. (596, 721, 746, 819, 1234, 1318, 1363, 1370, 1461, 1513, 2193, 2277)

S. monandrus Roseng., Arrill. & Izag., Bol. Fac. Agron. Univ. Montevideo 103: 12. 1968.

Common, rooted in superficial soils on granitic outcrops, occasionally in *cerrado* on lateritic crests; flowering September to May. Distribution: Brazil, Paraguay, Uruguay, and Argentina. (806, 914, 1230A, 1442, 1483, 1825)

S. pyramidatus (Lam.) Hitchc., U.S. Dept. Agr. Misc. Publ. 243: 84, f. 48. 1936. *Agrostis pyramidata* Lam., Tabl. Encycl. 1: 161. 1791. *Vilfa arguta* Nees, Agrost. Bras. 395.

1829. *Sporobolus argutus* (Nees) Kunth, Enum. Pl. 1: 215. 1833.

Rare, seasonal pond; flowering in February. Distribution: United States to Argentina; Bolivia: Cochabamba, Beni, and the Yungas. (1715)

S. sprengeii Kunth, Révis. Gramin. 1: 68. 1829. *Agrostis sporobolus* Sprengel, Nov. Prov. Hal. 46. 1819.

Part of an intergrading species complex that includes *S. cubensis* Hitchc., *S. adustus* (Trin.) Roseng., *S. aeneus* (Trin.) Kunth, *S. acuminatus* (Trin.) Hack., and *S. eximius* (Nees) Ekman. The only collection from Chiquitania is intermediate to currently accepted concepts of *S. aeneus* and *S. sprengeii* and is provisionally placed in the latter. Locally abundant in sandy soils of *campo rupestre* (Serranía de Santiago); flowering is stimulated by (probably dependent upon) fire. Distribution: Brazil. (2791)

Streptochaeta Schrader ex Nees

Judziewicz, E. J. & T. R. Soderstrom. 1989. Morphological, anatomical, and taxonomic studies in *Anomochloa* and *Streptochaeta* (Poaceae: Bambusoideae). Smithson. Contr. Bot. 68: 1-52.

S. spicata Schrader ex Nees, Agrost. Bras. 537. 1829. *Lepideilema lancifolium* Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 3: 172. 1840.

Rare, in deep shade of seasonal forest; flowering April and May. Distribution: Mexico to Argentina. (970, 1968)

Thrasya H.B.K.

KEY TO SPECIES

- 1a. Racemes 10-30 cm long; rachis 2-4 mm wide when folded, the margins glabrous; spikelets 5 mm long; upper floret concealed by the upper glume *T. petrosa*
- 1b. Racemes 3-10 cm long; rachis 1-1.5 mm wide when folded, the margins ciliate or glabrous; spikelets about 3 mm long; upper floret not concealed by the upper glume.
 - 2a. Rachis ciliate, the hairs stout, tuberculate-based, 1-1.5 mm long, turning yellow at maturity; bunch grass with intravaginal innovations; foliage basal *T. thrasyoidea*
 - 2b. Rachis glabrous or ciliate, the hairs delicate, not tuberculate-based nor yellowing with age; caespitose with extravaginal innovations; foliage cauline *T. crucensis*



FIGURE 7. *Thrasya crucensis* (Killeen 2334).—A. Base of plant.—B. Mid-portion of the culm.—C. Raceme (A, B, and C: bar = 5 cm).—D. Spikelet pairs and rachis.—E. Lower glume and lower lemma (D and E: bar = 1 mm).

T. crucensis Killeen, sp. nov. TYPE: Bolivia. Santa Cruz: granitic dome 1 km N of Rancho Puesto Nuevo, 35 km S of Concepción, Prva. Ñuflo de Chavez, 16°25'S, 62°00'W, 700 m, 26 Feb. 1987, Killeen 2334 (holotype, ISC; isotypes, LPB, F, SP, MO, US, SI). Figure 7.

T. petrosa (Trin.) Chase, affinis sed innovationibus extravaginalibus, culmis ramificantibus copiose ad nodos

medius faciens rami multi sterilis; foliis caulinis, ligulis 2–5 mm longis, laminis 2–4.5 mm latis; rachidibus racemorum 2.8 mm latis, marginalibus pilosis molliter, pilis 0.2–0.5 mm longis, spiculis 3.0 mm longis, lemmatibus inferior apex et basis pilosis glaber notabilis.

Caespitose perennial from extravaginal innovations, the rhizomes short. Culms terete, the internodes glabrous. Foliage cauline; sheaths longer than internodes, compressed, glabrous, auriculate;

auricles adnate to a membranous ligule 2–5 mm long; blades 4–25 cm long, 2–4 mm wide, linear, reduced at the upper nodes, revolute, glabrous. Inflorescence a single exserted raceme 5–15 cm long, the rachis foliaceous, 1.4 mm wide when folded, clasping the lower $\frac{1}{3}$ of spikelets, the margins softly pilose with white hairs 0.2–0.5 mm long; spikelets 3 mm long, paired, unequally pedicellate, the pedicels adnate to the midrib, each pair oriented in a single row with the backs of the lower lemmas facing each other; disarticulation below the glumes. Lower glume narrowly triangular, 2 mm long, adnate to the first rachilla internode at the base, or reduced to a cupulate bead; upper glume narrowly lanceolate, acute, sparsely pubescent along the margins, equaling the upper floret but not covering the sides of the upper lemma; lower floret staminate, the lemma chartaceous, splitting lengthwise to the base along a medial groove, hispid apically on the two lateral keels, the palea equaling the lemma, glabrous, acuminate; upper floret 2.2 mm long, narrowly elliptic, the lemma indurate, stramineous, smooth, bearded at the apex, the margins inrolled, the palea similar in texture, free at apex.

The spikelet morphology of *T. crucensis* is similar to the widespread species *T. petrosa*; however, the plants of *S. crucensis* have branched culms with cauline foliage (vs. unbranched culms with basal foliage), racemes 5–9(12) cm long (vs. (10)15–30 cm long), rachis margins 1 mm wide (vs. 2–3 mm wide), and spikelets 3 mm long (vs. 4–5.5 mm long). Moreover, *T. crucensis* has a markedly different habitat preference and phenology. It is restricted to cracks and superficial soils on bald granitic domes (inselbergs), and flowers January to (February) March; $2n = 20$, the type population. (Paratypes: 808, 1819)

T. petrosa (Trin.) Chase, Proc. Biol. Soc. Wash. 24: 115. 1911. *Panicum petrosum* Trin., Sp. Gram. 3: 280. 1836. *Tylothrasya petrosa* (Trin.) Doell in Mart., Fl. Bras. 2(2): 296. 1877.

Individual plants differ in stature, foliage vestiture, length of racemes, width and color of rachis wings, and the presence or absence of cilia on rachis margins. Different variants occur in mixed populations; very palatable (4). Common, to locally abundant in ungrazed *cerrado*; flowering January to (March) June; abnormal meiosis indicates probable apomixis. Distribution: Central America to Paraguay; Bolivia: the Beni. (738, 871, 1736, 1784, 1850, 1953, 1988, 2391, 2393, 2418; Cutler 7002 US)

T. thrasyoides (Trin.) Chase, Proc. Biol. Soc. Wash. 24: 114. 1911. *Panicum thrasyoides* Trin., Gram. Panic. 126. 1826. *T. hirsuta* Nees, Agrost. Bras. 94. 1829.

Locally abundant in *campo rupestre* (Serranía de San Lorenzo); flowering is dependent upon fire. Distribution: central Brazil. (2830)

Trachypogon Nees

T. plumosus (Humb. & Bonpl. ex Willd.) Nees, Agrost. Bras. 344. 1829. *Andropogon plumosus* Humb. & Bonpl. ex Willd., Sp. Pl. 918. 1806. *A. montufari* H.B.K., Nov. Gen. Sp. 1: 184. 1816. *T. montufari* (H.B.K.) Nees, Agrost. Bras. 342. 1829.

Locally abundant in Lomerio on rocky hillsides and ridgetops (*campo limpo*) and over lateritic crests; occasional in *campo cerrado* with deep red clay soils, in the sandy soils of seasonally humid savannas, and on valley-side *campos* (upslope); somewhat palatable (2); flowering inhibited by fire, November to (January) April; $2n = 20$. Distribution: Central America to Argentina; Bolivia: Tarija, Beni, Andean Piedmont of Santa Cruz, and the Yungas. (636, 637, 704, 777, 1448, 1617, 1651, 1758, 1776, 1817, **2310**)

Tripogon Roemer & Schultes

T. spicatus (Nees) Ekman, Ark. Bot. 11: 36. 1912. *Bromus spicatus* Nees, Agrost. Bras. 471. 1829. *Diplachne simplex* Doell in Mart., Fl. Bras. 2(3): 97. 1878. *D. spicata* (Nees) Doell in Mart., Fl. Bras. 2(3): 160. 1878. *Triplasis setacea* Griseb., Abh. Königl. Ges. Wiss. Gött. 24: 304. 1879. *Sieglingia spicata* (Nees) Kuntze ex Stuck., Anales Mus. Nac. Hist. Nat. Buenos Aires 11: 128. 1904. *Rabdochloa spicata* (Nees) Kuntze ex Stuck., Anales Mus. Nac. Hist. Nat. Buenos Aires 11: 121. 1904.

Common, superficial soils over granitic outcrops; flowering September to March. Distribution: United States to Argentina; Bolivia: Cochabamba. (812, 1224, 1463, 1543)

Tripsacum L.

de Wet, J. M. J., J. R. Harlan & D. E. Brink. 1982. Systematics of *Tripsacum dactyloides* (Gramineae). Amer. J. Bot. 69: 1251–1257. de Wet, J. M. J., D. H. Timothy, K. W. Hilu & G. B. Fletcher. 1981. Systematics of South American *Tripsacum* (Gramineae). Amer. J.

Bot. 68: 269–276. de Wet, J. M. J., J. R. Gray & J. R. Harlan. 1976. Systematics of *Tripsacum*. *Phytologia* 33(3): 203–227.

KEY TO SPECIES

- 1a. Culm internodes with lanulose tomentum; sheaths glabrous, pubescent or tomentose; staminate spikelets sessile *T. australe*
1b. Culm internodes and sheaths glabrous; staminate spikelets sessile and pedicellate
..... *T. andersonii*

T. andersonii J. R. Gray, *Phytologia* 33: 204. 1976.

Introduced into the area in the 1970s as a forage grass by the Fundación Baviera-Boliviana but not widely adopted; a few *estancias* may still have remnant populations. Local name: *pasto guatemala*.

T. australe Cutler & E. S. Anderson, *Ann. Missouri Bot. Gard.* 28: 259. 1941.

Occasional, forest margins and scrub thickets around granitic outcrops; palatable (3); flowering December to (February) April; $2n = 36$. Distribution: Venezuela, Colombia, Brazil, and Paraguay; Bolivia: Beni and the Yungas. (793, **841**, 1815, 2004, **2326**; Cutler 6007 US; Cutler 6008 MO)

Zea L.

Z. mays L., *Sp. Pl.* 971. 1753.

The local cultivar 'Cubano Amarillo' is used as an animal feed and to make a sweet *chica*, which is a staple of the local diet.

LITERATURE CITED

- BECK, S. G. 1984. Comunidades vegetales de las sabanas inundadas de NE Bolivia. *Phytocoenologia* 12: 321–350.
- BLACK, G. A. 1963. Grasses of the genus *Axonopus* (a taxonomic treatment). In: L. B. Smith (editor), *Advancing Frontiers of Plant Sciences* 5: 1–186.
- BURKHART, A. 1969. Flora Ilustrada de Entre Ríos (Argentina), Parte II. Gramíneas. In *Col. Cient. I.N.T.A.*, Volume 6, Pt. 2. Buenos Aires.
- CARO, J. A. & E. SÁNCHEZ. 1969. Los especies de *Cynodon* (Gramineae) de la República Argentina. *Kurtziana* 5: 191–252.
- COLE, M. M. 1986. *The Savannas, Biogeography and Geobotany*. Academic Press, London.
- DAVIDSE, G. 1978. A systematic study of the genus *Lasiacis* (Gramineae: Paniceae). *Ann. Missouri Bot. Gard.* 65: 1133–1254.
- DE LISLE, D. G. 1963. Taxonomy and distribution of the genus *Cenchrus*. *Iowa State Coll. J. Sci.* 37: 259–351.
- EITEN, G. 1972. The cerrado vegetation of Brazil. *Bot. Rev. (Lancaster)* 38: 201–341.
- . 1978. Delimitation of the cerrado concept. *Vegetatio* 36: 169–178.
- FOSTER, R. C. 1966. Studies in the flora of Bolivia. IV. Gramineae. *Rhodora* 68: 97–358.
- GARÓFALO-SPALDING, B. 1988. Systematics of the Genus *Axonopus* Section *Cabrera* (Gramineae–Paniceae). Masters Thesis. Iowa State Univ., Ames, Iowa.
- GOLDSMITH, F. B. 1974. Multivariate analysis of tropical grassland communities in Mato Grosso, Brazil. *J. Biogeogr.* 1: 111–122.
- GOULD, F. W. 1960. Chromosome numbers in southwestern grasses. II. *Amer. J. Bot.* 47: 873–877.
- GUAMÁN, C., A. & M. VALVERDE C. 1982. Levantamiento integrado del los recursos naturales de la Provincia Ñufflo de Chavez (sector Concepción). Estudio de Suelos. CORDECRUZ, Santa Cruz, Bolivia.
- HAASE, W. & S. BECK. 1989. Structure and composition of savanna vegetation in northern Bolivia: a preliminary report. *Brittonia* 4: 80–100.
- HENRARD, J. T. 1927. A critical revision of the genus *Aristida*. *Meded. Rijks-Herb.* 54A: 221–464.
- HITCHCOCK, A. S. 1927. The grasses of Ecuador, Peru, and Bolivia. *Contr. U.S. Natl. Herb.* 24(8): 291–556 (plus I–XX).
- HUMBOLDT, A. W., A. J. BONPLAND & C. S. KUNTH. 1816. *Nova Genera et Species Plantarum*. Volume 1, Pt. 1/2: 1–120. Lutatiae Parisiorum, Paris.
- NICORA, E. G. 1940. Nota taxonómica sobre *Eragrostis neesii* y *Eragrostis articulata*. *Revista Argent. Agron.* 7: 257–273.
- PALISOT DE BEAUVOIS, A. M. 1812. *Essai d'une nouvelle agrostographie*. Imprimerie de Fain, Paris.
- PATTERSON, R. T. 1984. Investigación y Desarrollo de Pastos Tropicales, Santa Cruz. CIAT/Misión Británica en Agricultura Tropical, Santa Cruz, Bolivia.
- POHL, R. W. 1980. Family #15, Gramineae. In: W. E. Burger (editor), *Flora Costaricensis*. Fieldiana, New Series 4: 1–608.
- RATTER, J. A., H. DE FRIETAS, G. ARGENT, P. E. GIBBS, J. SEMIR, G. SHEPHERD & J. TAMASHIRO. 1988. Floristic composition and community structure of a southern cerrado area in Brazil. *Notes Roy. Bot. Gard. Edinburgh* 45: 137–151.
- RENVOIZE, S. A. 1984. *The Grasses of Bahia*. Royal Botanic Gardens, Kew.
- . 1988. *Hatschbach's Paraná Grasses*. Royal Botanic Gardens, Kew.
- RUIZ, R. R. 1982. Levantamiento Integrado de los Recursos Naturales de la Región de Concepción, Prva. Ñufflo de Chávez, Estudio Forestal. CORDECRUZ, Santa Cruz, Bolivia.
- SMITH, L. B., D. C. WASSHAUSEN & R. KLEIN. 1982. Gramíneas. In: R. Reitz (editor), *Flora Ilustrada Catarinense*, Volumes 1, 2, 3. IOESC, Itajaí, Santa Catarina, Brazil.
- SØRENSEN, T. A. 1948. A method of establishing groups of equal amplitude in plant sociology based on similarity of species content, and its application to analysis of the vegetation on Danish commons. *K. dan Vidensk Selsk Biol. Skr.* 5: 1–34.
- STIEBER, M. T. 1982. Revision of *Ichnanthus* sect. *Ichnanthus* (Gramineae, Panicoideae). *Syst. Bot.* 7: 85–115.
- . 1987. Revision of *Ichnanthus* sect. *Foveo-*

- latus* (Gramineae: Panicoideae). Syst. Bot. 12: 187–216.
- TRINIUS, C. B. 1828. Species Graminum Iconibus et Descriptionibus Illustravit. Volume. 1, Pt. 9: 97–108. Impensis Academie Imperialis Scientiarum, St. Petersburg.
- TÜRPE, A. M. 1975. Los generos de Gramíneas de la Provincia de Tucumán (Argentina). Opera Lilloana 24: 1–199.
- VELDKAMPF, J. T. 1973. A revision of *Digitaria* Haller (Gramineae) in Malesia. Blumea 21: 1–80.
- ZULOAGA, F. O. 1986. Systematics of New World species of *Panicum* (Poaceae: Paniceae). Pp. 287–309 in T. R. Soderstrom, K. W. Hilu, C. S. Campbell & M. E. Barkworth (editors), Grass Systematics and Evolution. Smithsonian Institution, Washington, D.C.
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